



FRIDAY, JANUARY 8, 1897.

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Contributions.

Some Car Coupler Experience.

PITTSBURGH, Pa., Jan. 4, 1897.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have read with much interest the discussion of the Western Railway Club concerning the uncoupling of M. C. B. couplers, and also have noted the records regarding the breakage of the same. I have found from experience that at times the drawhead carrier iron becomes loose and allows the drawhead or coupler to drop from  $\frac{1}{4}$  in. to  $\frac{1}{2}$  in. This raises the clevis on locking-pin and lifts the pin, and the coupler becomes uncoupled.

Concerning the breakage of guard arms we found from experience that where a M. C. B. coupler is next to a link and pin drawhead, in many cases the link and pin drawhead has broken the guard arm off, caused by the slack in train when passing around curves. In some instances we have found the guard arm imbedded in the end sill, and it would require a slight blow from a sledge to dislodge it. We have found that where the cars are all equipped with M. C. B. couplers very few are broken at the guard arm.

CONSTANT READER.

A Convenient Moment Table.

CLEVELAND, O., Dec. 28, 1896.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Your issue of Dec. 25 contains an article headed "A Convenient Moment Table," and it seems rather odd that this matter should be published at this date as new. This identical method was in use by the Louisville Bridge & Iron Co. as far back as 1880, and was probably originated there by the late Mr. Gilman Trafton, then Chief Engineer, or by Mr. Edwin Thacher, who had been Principal Assistant Engineer for the same company up to about 1879. The method was in use by Mr. Thacher in 1885, while Chief Engineer of the Keystone Bridge Co.

As your correspondent states, the method is an exceedingly convenient one, not only for obtaining moments at panel points, but for obtaining the shearing stresses, the position of the engine for maximum shear, and also for obtaining the actual panel loads for the calculation of whipple trusses and swing-bridges. It is very convenient also for determining the load on trestle posts when this load is made up of the reactions from two adjacent spans of unequal length.

THE OSBORN CO., Civil Engineers.

Reservoir Construction.

18 South Bond Street,  
PHILADELPHIA, Dec. 29, 1896.)

TO THE EDITOR OF THE RAILROAD GAZETTE:

In your issue of Dec. 25 we note a communication on the Queen Lane Reservoir with reference to the death of its resident engineer by his own hand during his cross-examination. It was a convincing argument as to the baneful effects of politics and influence vs. engineering, as the judgment of the engineer was overruled by his superiors, and when the verdict of Nature set her seal of condemnation upon the result of the work and required the expenditure of nearly half a million dollars more to make it hold water, the engineer, who was made the scapegoat, sacrificed himself for his friends and for conscience sake.

The three causes of failure in reservoirs may be condensed into the site, the design and the construction. It is often difficult to ascribe a failure to any one of these. In this particular case special attention had been called to the permeable character of the site and the plans were prepared with full knowledge of the geology. They were based upon reservoirs of equal capacity which were in service and had given no trouble in other cities,

yet there were modifications made during construction which in our judgment impaired the utility of the structure for the purpose intended. These changes, which were referred to in your previous issue, were of such character as to bear the relation of cause and effect, as the leaks were found to be at or below the original surface of the ground and opposite to the points where the railroad tracks pass into the basins or where there was a structural weakness.

One of the notable omissions in the design of the lining was the absence of any bond between the clay and its protecting apron, or any berms to prevent slipping, or provision for drainage, so that water permeating the concrete would form an unguent on the clay and reduce the frictional support to the long slabs forming the revetment. These were 66 x 10 ft. and weighed nearly 30 tons each. There was no abutment at the bottom for the toe to rest upon, only a 4-in. concrete floor from which the top dressing of 2 in. had been omitted.

As to the leaking of all reservoirs, we think a distinction should be made between seepage and leakages, the former being generally diffused through the material during the process of saturation and seasoning, while the latter is due to defective workmanship, whereby some crack, joint or orifice is created for the escape of the fluid. A leak may become dangerous by internal supuration, carrying material away incessantly and depositing it in other distant cavities underground until a cavern is formed which may collapse suddenly with great loss to life and property. The result of a failure or rupture in this reservoir would be a serious calamity if it should occur when the reservoir is full, as its contents would weigh about 1,600,000 tons and its elevation (bottom) is 208 ft. above city datum. Below it and over the supporting slopes is located the thickly settled suburb known as the Falls of Schuylkill on the river of that name. The discharge of so large a volume down this precipitous slope would doubtless dam the river and flood many of the manufactories which skirt its branches, and hence no pains should be spared to make the structure tight and preserve the citizens from the menace which now threatens them.

HAUPT & FRANKLIN.

What High Speed Means.

NEW YORK, Jan. 2, 1897.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I was much interested by the article "What High Speed Means," in your issue of Jan. 1. Coming, as it does, from *The Engineer*, which has at various times made predictions as to the impossible in regard to high speed on railroads, I am not altogether surprised at it. I would like, however, to remind *The Engineer* that what has already been accomplished may be done again. And in this connection I should like to call attention to two or three cardinal principles in steam engineering that are often overlooked by designers of locomotives which are intended to be very fast and powerful, principles that are being departed from by a number of railroads.

*The Engineer* speaks of the trial of a locomotive weighing 70 tons with two brake vans, and says that everything was done to get up to the highest speed in the least time, and yet only once was 72 miles an hour reached in two miles. He believes that he is within the truth in saying that an assumed train of 150 tons cannot get up to 60 miles an hour in less than four miles; and that one mile will be used in coming to a stop. Allow me to compare this with an actual performance with a locomotive in actual service with a train that weighed 450 tons exclusive of engine and tender.

Official record of a run on the Pittsburgh, Fort Wayne & Chicago on June 20, 1887: Train No. 3 between Fort Wayne and Chicago, 148 miles; train consisting of one baggage car, five coaches and four Pullmans, 10 cars in all; running time, three hours and 45 minutes, including 23 stops and five slow-ups for bridges. This train made one run between stations, a distance of 9.5 miles, in 10 minutes to a second, and another run of 8.7 miles, including one crossing stop, in nine minutes. The train was hauled three miles up a 26-ft. grade, with brakes set, on one of the Pullman cars, caused by a brake sticking. The weight of the train was about 450 tons; engine 444, Lehigh Valley Railroad; A. H. Polhemus, Road Foreman; C. Walton, Trainmaster.

*The Railroad Gazette*, in commenting upon this, said: "Allowing 10 minutes for reduced speed entering Chicago, and two minutes each for the bridges mentioned in the report, makes a total of something like one hour and 23 minutes to be deducted from the three hours and 45 minutes given as the total for the run. This brings the average rate for the time while the train was under actual headway well up to 60 miles an hour, which, for 10 cars, is doing excellent work."

The most important statement in this report is: "Made one run between stations, a distance of 9.5 miles, in 10 minutes to a second; and another run of 8.7 miles, including one crossing stop, in 9 minutes." This time was taken from the time the wheels began to turn until the engine had come to a dead stop at the next stopping place.

How does *The Engineer* account for these facts if it requires four miles to get up to 60 miles an hour with a 150-ton train?

Another instance: This same engine on the Northern Pacific on June 25, 1887, pulled a train that weighed 950,000 lbs., including engine and tender, from Royalson to Little Falls, a distance of 10.5 miles, in 11 minutes from

stop to stop. When doing this she indicated 1,810 H. P. and showed a mean effective pressure of 70 lbs. at 325 revolutions per minute, 1,300 piston speed.

How do we account for the way this engine picked up these very heavy trains and put them at such high speeds in such short distances? The answer is a very simple one. She had the ability to maintain a very high mean effective pressure on a large, or pair of large, pistons moving at very high piston speed; and this is where the 70-ton locomotive spoken of by *The Engineer* as not being able to put two vans up to 72 miles an hour short of two miles is lacking.

This latter locomotive had 7-ft. driving wheels, and an 18 x 24-in. cylinder, and probably a short port, with a very short travel of valve, and could not get, at this speed, more than about thirty-five lbs. mean effective pressure; and owing to her 7-ft. driving-wheels, could not get more than 960 ft. of piston travel, when moving at 60 miles an hour. This would give her less than 600 H. P., while the other engine indicated 1,810 H. P.

Here is where some people are making a mistake for high-speed locomotives on ordinary roads, where the roads are not level, and where trains have to make frequent or occasional stops, by giving an engine wheels so large as to make her slow about picking up a train, and also insufficient power to maintain her scheduled speed on grades. I have noticed on a number of roads having some of the most modern locomotives, that when a grade of, say, 26 ft. to the mile is reached, the speed slackens and the engine begins to labor.

An ideal condition of fast train service is a locomotive that can make the schedule whatever it may be over the average grades, as fast up the grade as it is safe for her to run down them; and on some mountain roads this is the only safe rule to follow. To be able to accomplish this one must have all of the following qualities: (1) A well-maintained, high, mean effective pressure. (2) High piston speed. (3) Enough adhesion, or tractive force, to do the work on grades, and in starting trains with as little slipping as possible.

This involves the use of a boiler of large heating surface and large grate area, capable of carrying high pressures safely, and large cylinder power with a valve and valve gear capable of giving the high mean effective pressure at the high piston speeds and with weight enough on the driving-wheels to do the work without slipping or without overloading the track and bridges, which may require six-coupled engines, with driving-wheels not so large as to reduce piston speed. Such an engine, properly balanced, will make that which *The Engineer* calls one of the impossible things an easy task.

GEO. S. STRONG.

Connecticut Railroad Commissioners' Report.

The Railroad Commissioners of Connecticut, George M. Woodruff, William O. Seymour and A. C. Robertson, have issued the forty-fourth annual report of the Commission. It is dated Dec. 19 and contains the annual reports of both steam and street railroads; those of the former being to June 30 and those of the latter to Sept. 30.

The Board has dealt with 60 petitions, complaints, etc., and all with very little friction. Only one case has been appealed. The complicated problem of eliminating grade crossings in Bridgeport is still unsettled, some parties in that city having entered suit in the courts to prevent the carrying out of the agreement between the city and the railroad company.

Gates have been ordered at three highway crossings (in as many different towns) and electric bells at three others. At one place in Danbury a bell put in several years ago by order of the Board is now deemed insufficient, owing to the increase in travel, especially children, and the road has been ordered to keep a flagman at the crossing. The Board has authorized the running of two summer passenger trains on Sunday, both early in the morning.

The usual financial summaries are given, together with notes on the physical condition of each road or important division.

The returns from street railroads are not yet satisfactory, time being required to establish uniform accounting. All of the street roads now reporting are equipped with electricity. Several orders have been issued by the Board during the year to equip street cars with fenders, but the Commissioners regard the fender question as still unsettled. In some cities there is strong objection to a fender extending several feet in front of a car, while in others this form is preferred. The Commissioners call attention to the need of power brakes on electric cars, especially where two or more cars are run together. An efficient brake is believed to be a greater preventive of injury to persons on the track than any kind of fender. The statistical tables of standard railroads include much matter outside of Connecticut, and the totals therefore have, for the most part, little significance. We copy such as refer to Connecticut alone:

Highway crossings at grade, number of.....	1,030
" previous year.....	1,083
Passengers killed.....	2
" injured.....	12
Employees killed.....	37
" injured.....	217
Persons killed at highway crossings.....	11
" injured at.....	16
Trespassers killed.....	95
" injured.....	70
Other persons killed.....	10
" injured.....	11
Total persons killed.....	155
" injured.....	326
Length of road in Connecticut (miles).....	1,008
" second, third and fourth main track in Connecticut.....	313



The totals made up from the reports of street railroads, being substantially all for business and territory wholly within the State of Connecticut, we copy in full:

	1896.	1895.
Length of road, miles.....	329	300
including sidings.....	352	317
Miles run.....	12,597,085	7,782,530
Passengers carried.....	52,789,791	38,037,434
Number of employees.....	1,795	1,525
Number of persons killed.....	20	12
injured.....	270	238
Capital stock issued.....	\$9,221,740	\$8,694,240
Bonds issued.....	8,690,100	7,995,000
Floating debt.....	849,256	1,123,458
Cost of construction and equipment.....	18,585,351	11,972,653
Gross earnings.....	2,589,619	2,523,051
Operating expenses.....	1,704,795	1,523,191
Net earnings.....	885,122	708,860
Dividends.....	221,120	168,630
Interest paid.....	417,060	278,136
Taxes paid.....	128,131	76,522

#### The New Water Scoop of the Pennsylvania Railroad.

The Pennsylvania Railroad has put in use, since the middle of 1894, a water scoop as a standard for new passenger engines, and for the new engines designed for fast freight service. The accompanying illustrations show the general arrangement and some details of this scoop.

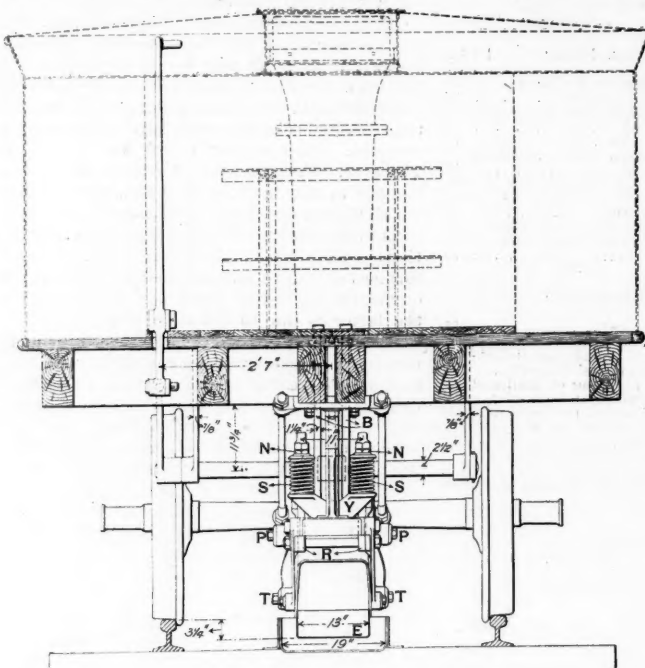
With the old form of scoop it was absolutely necessary to run slowly while taking water, thus causing loss of time. If the speed when taking water was too great it became impossible to lift the dipper from the water, and in consequence it often had to be dragged over the end of the trough, crushing the mouth of the dipper. This balanced tender scoop was designed to overcome these difficulties. The power necessary to lift the dipper out of the water has to be entirely independent of the speed at which the tender is moving. This was accomplished by pivoting the dipper proper, that is, the portion from *D* to *E*, near its center, on trunnions *T*, so that the pressure due to the centrifugal force of the water in the upper half balances that in the lower half. The upper part of the dipper is connected to the uptake pipe *M* by an intermediate section *J*, which is supported on the pivots *P*. The joint between this intermediate section and the uptake pipe is indicated by a dotted line. The short section can, therefore, turn about the pivot *P*, and can move in contact with the pipe *M*. The junction of the dipper with *J* is of a segmental form drawn from *T* as a center. The dipper can, therefore, turn about the pivot *T*, and can move in contact with *J* on

also a convenient mode of adjusting the position of the mouth of the dipper. The hanger *H* with adjustable set screw *M*, is simply a safeguard against any springing of the tender frame, which would result in lowering the mouth of the dipper in the trough, and a possibility of scraping along the bottom.

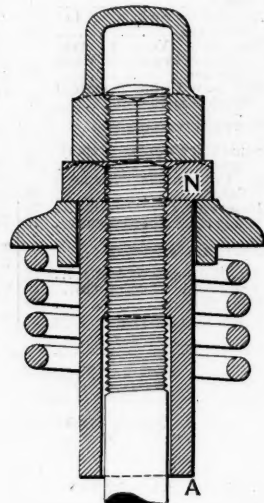
In lowering the dipper the only resistance is that due

the new mogul simple and compound engines, designed for fast freight service, have been equipped with this balanced scoop, and there are now about 75 of them in service.

The principal advantages of the new scoop are that it is easily manipulated, it is not necessary to slow down to take water, and hence no time is lost. Less water is wasted by being slopped out of the trough, more water per 100 ft. of trough is delivered into the tender, and consequently shorter troughs can be used and the cost



End View of Tender, with Water Scoop.



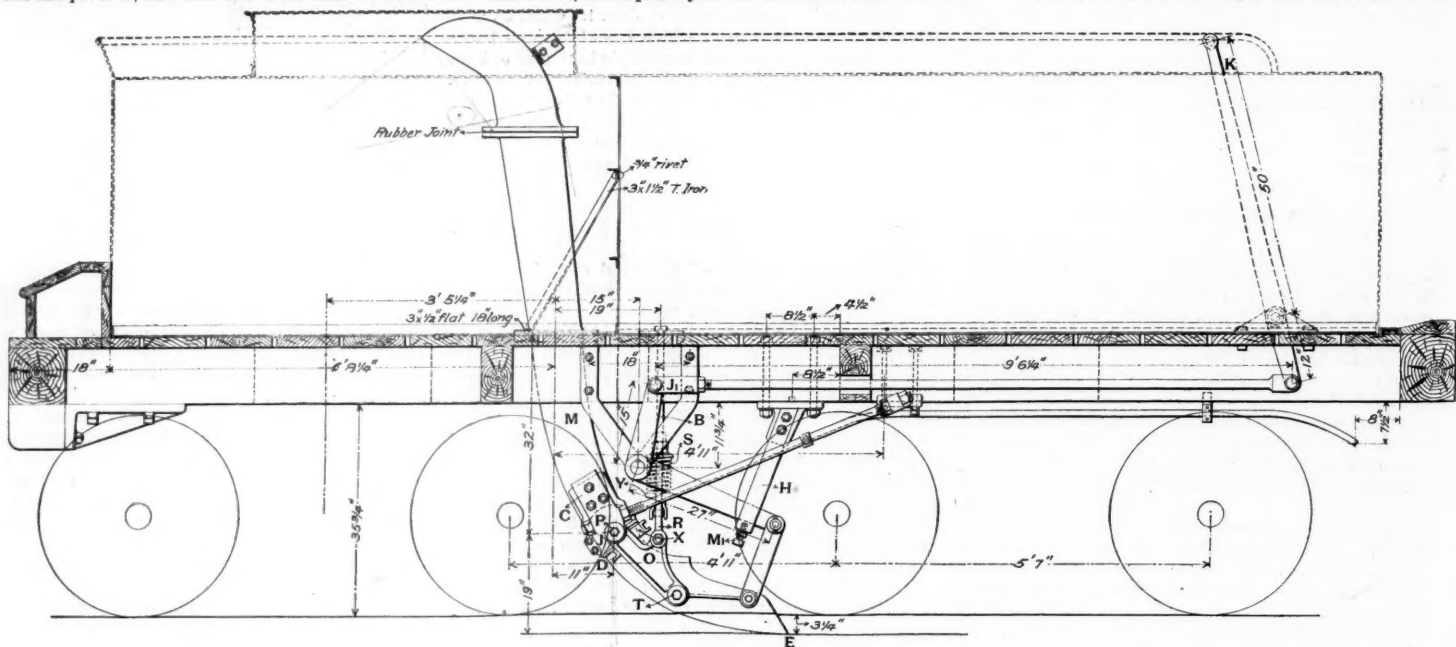
Detail of Spring.

to the springs *SS*. In raising it out of the water the pressure on the trunnions *T* holds down the cradle and the dipper moves round the trunnions *T* until the stops *XX* touch the arms of the cradle. This gives enough motion to the dipper to allow the mouth to rise clear of the water, consequently no more water rushes in and

of repairs is less. There is no difficulty with this scoop in filling tenders even when running double-headers.

#### The Teaching of Railroad Mechanical Engineering.

At the November meeting of the North West Railway



Pennsylvania Tender Fitted with the New Water Scoop

the segmental joint. It will thus be seen that the dipper is balanced on the pivots *T* attached to brackets *O*, which are cast on and form a part of the intermediate section *J*.

The top of the dipper is open to a point immediately above the pivots *T*, so that any spray or wave may be carried up with the larger body of water. The intermediate joint *J* of the conduit is pivoted at *P*, and is held by cheek pieces *C*. The cradle itself is attached to two rods *RR*, passing through two light spiral springs *SS*, which are compressed when the dipper is lowered. These springs are set on a yoke *Y*, fixed to the frame of the tender by means of bolts *BB*, and serve only as a balance for the weight of the dipper and other movable parts when the dipper is not in use, so that if any thing should give way or a pin be lost, the dipper would not drop to the track and possibly cause damage. The nuts *NN* at the top of the springs project partly inside of the coils as shown in detail, and form a definite stop and

the rest of the movement takes place easily around the pivot *P*.

Before adopting this scoop as a standard it was subjected to thorough tests at various speeds ranging from 20 miles to 70 miles an hour. At the latter speed it filled a 3,000-gallon tender in nine seconds. The tests proved it to be entirely satisfactory, and superior in efficiency as well as in all other respects, to the old form. Since July, 1894, all new passenger engines built, as well as

Club, Prof. H. Wade Hibbard, of the University of Minnesota, read a paper on the above subject. We give below some extracts from it:

It is needless to say that a professor of locomotive engineering should have been a technical graduate with extended and official railway experience. Technical railroad men are few in the first place, and the pleasures and rewards of practicing railway engineering are so great that it has been rare that one has made the change to the quieter life of the university.

American locomotive practice has been pre-eminently commercial along the lines of the larger economics, as illustrated by the enormous loading of our locomotives. Practical railroad men have made these large savings, and in the newness and vast expansion of American railroad business the general managers have not until recently felt the need of a smaller economics, large though the aggregate might be, which the educated engineer alone could introduce.

In considering the place of railway mechanical engineering as a technical school study, the question of time is at once confronted. The fundamental studies of the four years must not be neglected, which form the foundation necessary for whatever special engineering structure may afterward be erected. A man who is given sufficient shop work to make him, not an expert mechanic, but familiar with shop processes and what can be accomplished by the molder, at the forge and in the machine shop; and who has been thoroughly drilled in mathematics as a tool, practical physics, engineering chemistry, modern technical languages, drawing, the principles of the sciences of machine design and of the action of steam and other motive powers; a man thus thoroughly grounded is more truly upon the road to success than one who lacks this training and has had extensive instruction in the details of the profession he is going to follow.

It is, however, not necessary to omit these requirements. During the senior year much can be accomplished by using the time allotted to electives, to the "Journal Club," to designing and drawing, to work in testing and to the graduation thesis. This is the plan which, inaugurated by the writer a year ago in the University of Minnesota, has proved entirely satisfactory. To fill out the elective a course of daily lectures is given throughout the year upon the following lines, quoting from the catalogue:

Past and future development of the locomotive.

Materials of construction. Motive power: specifications and standards.

Locomotive and train resistance. The track from motive power point of view.

The locomotive boiler: Types, proportions, details, accessories and attachments, grates and heating surfaces, lagging, fuels, smoke prevention, water circulation, testing effect of temperature upon metals, shop work.

The locomotive engine: Details, piston speed, reciprocating parts, bearing surfaces, link and valve motions, steam distribution, heat insulation.

The locomotive as a carriage: Limitations, frames, spring and equalizing rigging, journals, engine trucks and wheels, drivers and their counter-balancing, brakes, steam heat, cab.

The tender; tank and attachments, wood and iron frames, built-up and solid trucks.

Locomotive management: engine loads, coal premiums, crew systems, expert instructions. Wear limits and repairs. Lubrication. Performance sheets.

Compound locomotives; systems and types, conditions for economy, cost of building and repairs.

European locomotive engineering and conditions of competition with American locomotives.

The domain and outlook for electric traction. The involved problems from electrical, railway and business standpoints.

Drawing room practice: preparation, management and classification of work, preservation of records, relations with the shops.

The shops: their arrangement, tools, cost and subdivision of power, labor paying, apprentices, reduction of costs and wastes.

The railway test room and test department: inspection and purchase of supplies, service tests of equipment. Relations of general store house.

The railway Mechanical Engineer and Superintendent of Motive Power, their qualifications and duties.

In these lectures the students are constantly being required to read articles in the railroad papers, the proceedings of the Master Mechanics' and Master Car Builders' Associations and of the American Society of Mechanical Engineers, complete files of which are always open to the men for free access. The literature of the railway clubs is of course found extremely valuable as recording the results of the most recent practice. The library of railway blue prints is consulted in illustration of both past progress and the present "state of the art." This collection, dating from 1867 and now numbering nearly 1,500, is being frequently enriched by large additions from the leading railroads and locomotive builders of the country, 85 drawings having just come from the Pennsylvania & West Shore roads. Visits to shops and roundhouses emphasize the facts of the lecture-room.

The Journal Club meets weekly for discussion of the technical newspapers. Each member is allotted one weekly, and if possible also one monthly, which he reads with care and reports to the Club whatever of their contents he judges of sufficient value. As an example of the methods, a particular case may be taken. One paper has an article upon the uses and costs of compressed air in a railroad shop. A preliminary discussion by the club makes it evident, to the instructor that a more extensive reading up upon the subject is needed by the members before it can be profitably discussed, and it is put over one week to permit this. Each member fills out a blank slip relating to each important item presented to the Club and it is placed in its proper alphabetical order in his private "card index" of technical information and references.

Designing and drawing is, of course, intended to teach the general principles involved in such work. Some special design, different for each student so that more may be gained by the class as a whole, is taken up and carried through to its completion; such methods, with proper modifications for purposes of teaching, being followed as have been found successful by the writer in commercial drafting-room management. There are perhaps no problems involving such a variety of outlook and treatment as those relating to railway design, and if a senior develops a taste that way he may choose

such a problem. It is the constant endeavor to keep the designer thoroughly in touch with the best railway work, having always in sight the limitations to strictly theoretical design which railway experience has found financially and practically to exist.

In locomotive testing valuable experience was gained for the students in locomotive engineering the past year by road tests of five locomotives upon one of the lines leading out from the twin cities. These tests included the use of a dynamometer car, following completely the Master Mechanics' Association standard directions.

In valve gears the latter part is devoted to the Stephenson shifting link motion as ordinarily found on locomotives, marine engines and reversing stationary engines. It is first analyzed geometrically by the excellent Bilgram diagram giving a close approximation to the desired result in steam distribution, and is then designed practically in all its parts by a full sized model largely after the Auchincloss method.

There has thus been described what is now being done in the State University without making any radical change in general foundation studies. As the demand increases for technical men in the railway service, the number of men desiring to study railway mechanical engineering will increase, and some modifications in the fourth-year course may be indicated in other ways. The senior year in locomotive engineering would then be made to take a place similar to the senior year in electrical engineering at Cornell University.

It is, of course, apparent that the preceding scheme for locomotive engineering cannot be expected to give the thorough teaching which the addition of a graduate year in railway mechanical engineering would permit. The latter would deal with the subject much more extensively, as well as intensively, and would permit the study of more of the problems that the railway mechanical engineers and superintendents of motive power are called upon to settle.

The arrangement of courses is made independent of the senior year, and would be suitable for a college attracting many graduate students from other institutions. The hours are credit hours per week, designing

itself. The machine is driven from the engine or other shaft whose speed is to be indicated, and from it wires lead to the indicator dial shown in Fig. 2, which is a simple voltmeter graduated to read revolutions instead of volts.

The field must be of constant strength in order that

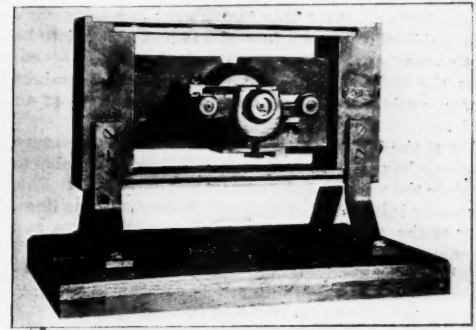
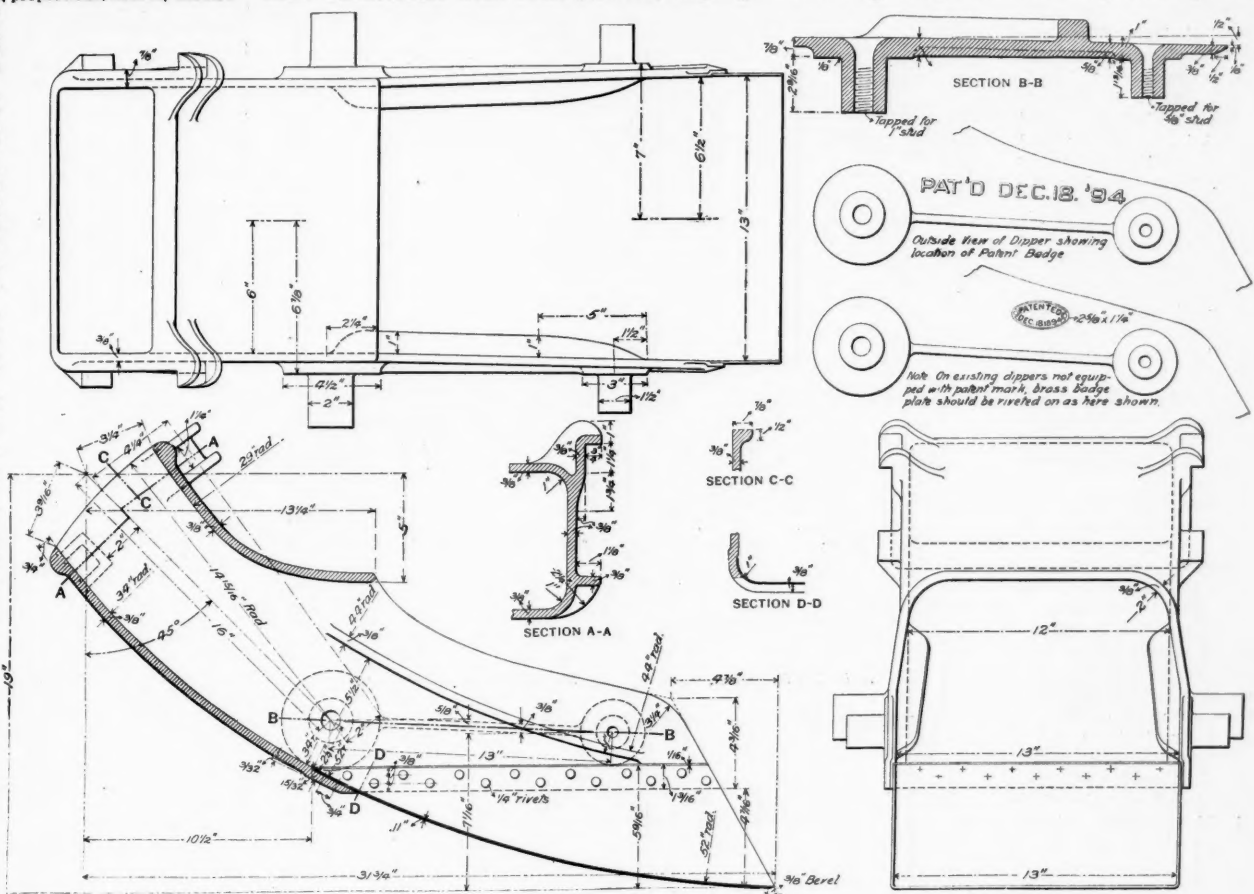


Fig. 1.

the voltage produced may be proportional to the speed. To accomplish this the magnets are made of a special grade of steel. The armature is of the iron-clad type which adds greatly to its efficiency as a keeper, and so assists in preventing any deterioration in the strength of the field. Should any variation in magnetism occur, means of regulating the machine are provided by an ad-



Details of Water Scoop—Pennsylvania Railroad.

and testing requiring two hours' work for each credit hour.

	1st Term.	2d Term.	3d Term.
Locomotive lectures.....	5	5	5
Locomotive designing.....	5	5	5
Testing.....	3	1	3
General railway mechanical engineering lectures.....	2	2	2
Seminar work, railway journals and thesis.....	2	2	5
Car lectures and designing.....	2	4	0
Elective, subject to approval, but preferably electrical engineering.....	3	3	2
	22	22	22

#### A Revolution Indicator.

The Electro-Dynamic Company, of Philadelphia, has recently put on the market a revolution indicator involving novel principles. A revolution indicator differs from a revolution counter, in that the indicator shows, by a pointer on a dial, the actual rate of speed at any moment instead of simply counting the number of revolutions.

The instrument shown is worked by electricity, depending on the fact that the voltage generated by an armature revolving in a constant magnetic field is proportional to the speed; therefore the voltage is an index of the speed of a revolving shaft. A voltmeter, graduated in revolutions instead of volts, shows at any moment the speed at which the generator is revolving.

Fig. 1 shows the generator, which is a magnetic machine, differing from a dynamo, in that it has permanent magnets for the fields instead of magnets excited by

justable shunt in the air gap. The dial indicators are also capable of adjustment and correction, both for zero and amount of deflection. These adjustments are simple, based on comparing the readings of the indicator with those of an ordinary revolution counter.

An important feature of this apparatus not possessed

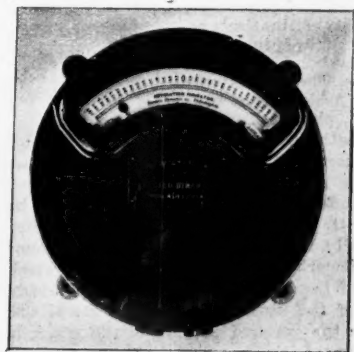


Fig. 2.

by any mechanical indicator, is that any number of dials may be connected to the same generator, and be placed in widely separated locations. In its application to marine engines this indicator has been found especially



useful, as not only does it show the speed but also the direction of turning. Should the generator be reversed the direction of the current will also be reversed and at once shown on the dial by the pointer moving to the opposite end of the scale. In marine use, it is customary to have dials in the chief engineer's room and on the bridge of the vessel.

One of the effects of this instrument in marine work is to enable the two engines of a twin-screw ship to be kept as nearly as possible at the desired speed. This enables the rudder to be kept amidships on a straight course, avoiding the drag due to its being kept at an angle.

One of the fast Atlantic steamships is claimed to save over two hours a trip as a result of thus being able to regulate the engines and keep the rudder central. This apparatus is installed on the ships of the American lines, some of the new ships of the navy, several yachts and other steam vessels.

Railroad men and engineers, making tests of engines and machinery where the speed is constantly varying, will appreciate the advantages of this device.

#### The Foundations of the Gillender Building.

For several months past, work has been in progress on a 19-story office building at the northwest corner of Wall and Nassau streets. The building is of steel cage construction, with four columns extending to the top of the seventeenth story and eight columns to the top of the nineteenth, and has a cylindrical cupola with spherical dome. The three lower stories are of granite and the remainder of Indiana limestone. It fronts 25 ft. 2 in. on Wall street and 73 ft. 5 in. on Nassau, and covers a total area of 1,896.3 sq. ft. The height above the pavement to the base of the cupola is 253 ft., and the total weight is about 10,000 tons. This is carried on three foundations, one 15 x 24 ft. and two 12 x 24 ft., arranged as shown on the ground plan Fig. 1. These foundations are built of brick and concrete, and are all sunk to hard pan, which at this place was reached at a depth of from 50 to 55 ft. below the pavement.

On account of the nature of the ground, the main portion of which is water-saturated sand, through which the foundations had to be sunk, it was necessary to use pneumatic caissons in this work. These were built of yellow pine, the use of wood being decided upon as most economical and convenient, as subsequent experience during construction confirmed. The timber used was planed on all sides to exact dimensions, and was framed and bored before coming to the site. The construction of the caissons is shown in Figs. 2 and 3. The deck of the working chamber of each was made of three courses of 12 x 12-in. timbers spiked together with  $\frac{3}{4}$ -in. drift bolts, 30 in. long. The middle course was laid at right angles to the other two. The walls of the chamber were built of two thicknesses of 12 x 12-in. timbers, held together by  $\frac{3}{4}$ -in. square head screw bolts and  $\frac{3}{4}$ -in. drift bolts. These walls were sheathed inside and out with 4 x 12-in. planking. The inside sheathing terminated at the deck, but that on the outside extended to a height of 25 ft. 6 in. above the cutting edge. Above this sheathing, for a height of about 15 ft., a cofferdam was built after the caisson had sunk about 30 ft. This was made of 2-in. planking spiked horizontally, for the purpose of afterward removing it, to a framework of 8 x 8-in. timbers, which was bolted to the top of the caisson. A 6 x 6 x  $\frac{1}{2}$ -in. angle bolted to the side of the first and to the bottom of the second course, in the bevelled portion of the walls, helped to strengthen the joint between those courses.

The cutting edge of the caisson was made of  $\frac{1}{2}$ -in. steel plates, 30 in. wide, which formed a band around the lower edge of the structure. This band was joined at each corner by a 6 x 6 x  $\frac{1}{2}$ -in. angle, and the whole was fastened to the wood work by bolts whose heads were countersunk into the iron plates. These bolts extended through the walls of the chamber, the nuts being placed

in counterbored holes in the first two courses. The lower edge of the band was stiffened by 6 x 6 x  $\frac{1}{2}$ -in. angles riveted to the plates and bolted to the lowest course of the walls, as shown in Fig. 3.

Extending across the working chamber from side to side are two 12 x 12-in. struts, having their ends mortised into the second course of the side walls. The long sides are further strengthened by two 1 $\frac{1}{4}$ -in. tie rods, each having a sleeve nut at its middle, placed one on either side of each strut.

Two 36-in. shafts with air locks entered the working chamber. The one passing through the center of the deck was used for the removal of the material, and the other was used by the workmen. Two 4-in. holes also pierced the deck. Through these the air supply passed into the caisson.

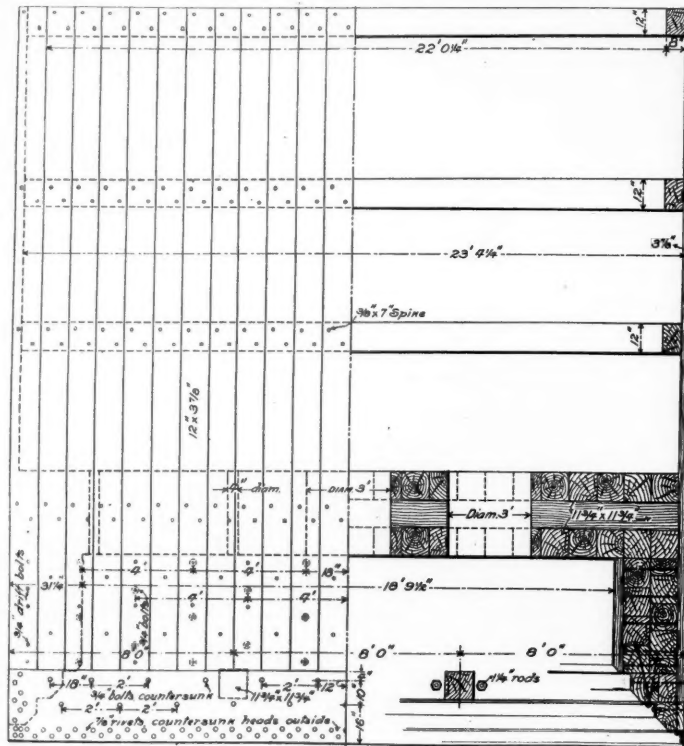
The caissons were sunk nearly the entire depth to which they went through fine micaceous quicksand, the lower 25 ft. of which was water-soaked. The air pressure employed varied from 3 or 4 lbs. at the start to a maximum of 18 lbs., when the caisson was nearly down. Each caisson was loaded with about 150 tons of pig iron and I-beams, and had the outside planking greased to diminish skin friction.

A force of six men and a foreman worked in a caisson at a time, in shifts of eight hours each. By this force, the middle caisson was sunk in seven days. The other two did not take so long, four days being required by

After the caisson had been sunk as far as intended, the hard pan was dug away for a depth of from 1 to 2 ft. below the cutting edge. The air-chamber, the wells through the brickwork and the space thus made were filled with concrete. A bed of concrete about 1 ft. thick was then laid on top of the pier, extending to the sheetpiling on all sides. On top of this 20-in. I-beams, 64 lbs., were placed side by side, as shown in Fig. 1, and the spaces between them filled with concrete and grouting. There are 24 of these at the top of each 12 x 24-ft. caisson and 26 on the other. Across and on top of the I-beams two plate girders are placed as shown. Across and on top of the ends of these two more girders are placed and near the ends of these the columns of the steel cage rest. The I-beams and cantilevers were first painted an ' then coated with coal tar. The space around both sets of girders is filled with concrete.

The weight which each foundation has to carry is about 12 tons per square foot at hard pan, with the full live load of 100 lbs. per square foot on each floor. The load of the building is transferred to the foundations by columns, arranged as shown in the ground plan. The two columns at either end of building carry about 650 tons each; the four columns adjoining them carry about 750 tons apiece, and each of the four center columns is loaded with about 850 tons. The middle of each foundation is on the line through the center of gravity of the weights on the columns. This brought the two outside foundations near the second pair of columns from the end, and away from the others, while in the middle one the center line is between the four columns.

The girders which rest on top of the I-beams are 4 ft. 3 $\frac{3}{4}$  in. in height over all and are built with three webs made of  $\frac{1}{2}$ -in. plates. The middle web consists of two such plates held side by side, and each end of this web is further reinforced for a distance of 6 ft. by two  $\frac{3}{4}$ -in. stiffening plates, one fastened to either side. The outside webs are stiffened vertically by 6 x 4 x  $\frac{1}{2}$  in. angles, each backed by a  $\frac{3}{4}$  in. filling plate, riveted to the web plates, as shown in elevation, Fig. 4. The girders have three  $\frac{3}{4}$ -in. cover plates, 36 in. wide, top and bottom. These are attached to the webs by 6 x 6 x  $\frac{3}{4}$  in. angles.

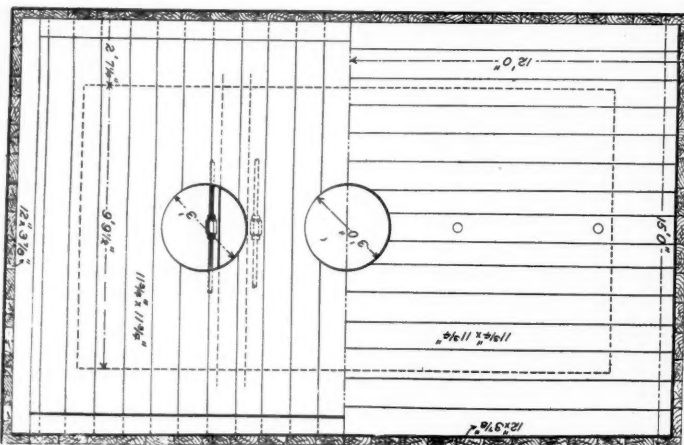


Half Side Elevation.

Half Longitudinal Section.

Half End Elevation.

Half Cross Section.



Half Plan above Middle Course of Deck.

Half Plan above Deck.

Fig. 2—Plans, Elevations and Sections of Caissons—Gillender Building.

each. In these cases a single shift would sink the caisson about 5 ft.

After each caisson had been sunk, 2 in. sheetpiling, with a 1-in. slip tongue, was driven all around it to a depth of about 18 ft., as shown in Fig. 4. As it was driven close to the walls of the adjoining building, in an angle of which the new one is situated, it came about 1 ft. 6 in. from the west ends of the caissons. On the east, or Nassau street ends, it was driven at a distance of 4 ft. 3 in. from the cofferdams. The sheetpiling was driven 1 ft. 8 in. away from the sides of the caissons. After the sheetpiling had been driven around a caisson, the material between it and the cofferdam was removed, and the cofferdam cut off to admit the I-beams.

Before a caisson was sunk, about half the brick pier was built, wells being left for the shafts and air-pipes. The remainder of the pier was laid after the shafts had been lengthened, and while a caisson was being sunk.

The heads of such rivets as come over the I-beams or under the upper girders above are countersunk.

The top set of girders upon which the columns rest is also made with three webs, the middle one being of two plates the same as in the other girders. The webs of these are reinforced vertically by stiffening plates, angles and filling bars also. The web stiffening plates in this case extend only 3 ft. 6 in. in from the ends. The web-plates and web-stiffeners are the same thickness as in the other set of girders. The cover plates, which are 2 ft. wide and  $\frac{1}{2}$ -in. thick, one top and one bottom, are each fastened to the middle web by two 6 x 6 x  $\frac{1}{2}$  in. angles, and to each outside web by one angle 6 x 4 x  $\frac{1}{2}$  in. The web stiffening angles are 6 x 3 $\frac{1}{2}$  x  $\frac{1}{2}$  in., and are also backed by filling bars  $\frac{1}{2}$  in. thick. This set of girders is 4 ft. 0 $\frac{1}{2}$  in. high. To the under cover plates at each end where the girders rest upon the others a sole plate 38 in. long and  $\frac{1}{2}$  in. thick is attached. The space between the webs inside of each girder is filled with Portland cement grout for protection against corrosion.

Before the caissons could be sunk, it was necessary to support the walls of the adjoining seven-story building, which is carried on the sand. This was done by sinking wrought-iron tubes to hard pan, and then on top of each of these, building a brick pier extending up to a bearing surface in the wall. To accomplish this, chambers 20 in. wide and 20 in. deep were cut in the brick walls at intervals of about 7 ft. These chambers were carried down through the bottom of the wall foundations, and extended to a height of about 10 ft. above the new cellar bottom.

The tubes to be sunk were 16 in. in diameter,  $\frac{3}{8}$  in. thick, lap welded, and composed of sections 4 ft. 6 in. long. These were joined together by 6-in. couplings,  $\frac{1}{2}$  in. thick. The ends of each length were faced so as to make a solid butt joint. The lower end of the bottom length was reinforced with a 1-in. inside ring, and the upper end of the top length with a  $\frac{1}{2}$ -in. outside ring machined to receive a cap. To sink one of the tubes, the first section was placed in the chamber cut in the wall, and on top of this, a 30-in. working length was coupled. On top of this piece of tube a plate was placed, and above this the 60-ton hydraulic jack used to force



the tubes down. Between the top of the jack and the top of the chamber blocks were then inserted to fill out. Against the bricks at the top of the chamber two old crusher plates of chrome steel, 12 x 28 x 5 in. were placed to receive the thrust of the jack. When a tube had sunk a certain distance, the jack would be let down and some new blocks put in above to fill out again. As each section sank below a certain point, the working length would be removed and a new section screwed on. The working length would then be attached to the top of the new one and the whole forced down again, thus finally reaching hard pan, which was found at about the same depth as in the caissons, requiring nine lengths of tube to reach it.

In sinking these tubes a  $\frac{3}{4}$ -in. water jet, supplied

was on a firm bottom. Under that load a tube would be compressed about  $\frac{1}{4}$  in. and upon its removal would assume its original length again. The tubes were then filled with concrete and an opening was left through which to force in grouting. It required about 48 hours apiece to sink the tubes.

The cylinders were each capped with a plate 34 in. square and 1 in. thick, with ribbed socket fitting closely and faced inside to fit the top of the tube. A brick pier, filling the chamber in the wall, was then built on top of the cap to a height of 2 ft. At this point two 18×30×4 in. wedging plates were inserted, and the pier continued up to the brick surface, forming the top of the chamber cut in the wall.

After the masonry of the piers had become solid, the

no additional progress. The contractors believe that there is little doubt but that with favorable weather, instead of almost constant rains, and with the experience gained on this work such caissons could be sunk to place in 48 hours each.

The machinery used in the operations was carefully arranged so as to take up little room. It consisted of two hoisting engines, two 12x16 air compressors, a small steam pump and a pile driver, all of which were supplied with steam taken from a pipe of the New York Steam Co. Because of the absence of boilers, the other machinery needing but little space, the hoisting engines were placed beneath the raised wooden sidewalk on Nassau street and the air compressors under that on Wall street, all being outside of the cellar. From the

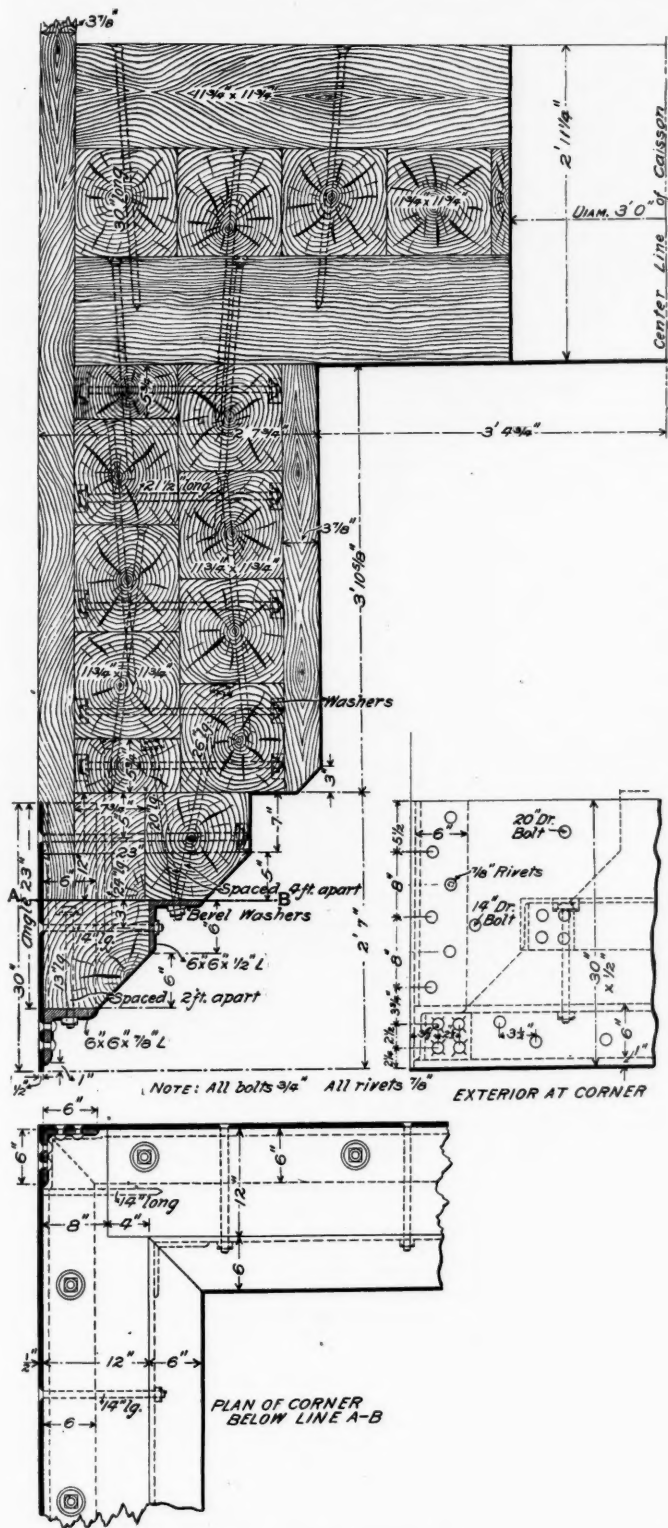


Fig. 3.—Details of Caissons.

by a Worthington duplex pump with 2-in. suction and 1½-in. discharge, working under a pressure of about 50 lbs., was used to keep the inside of the tubes clear from sand. To use this, a slot 20 in. long and 2 in. wide was cut in the side of the working length of tube. The hose supplying the water for the jet was put through this slot and allowed to hang down within the tube, the nozzle coming about 1 ft. above the bottom of the tube. This distance was, however, varied, the hose and nozzle being sometimes worked up and down and around inside the tube. The water in which the particles of sand were sustained was taken from the tube by means of a 2-in. hole drilled through the working length below the slot. Any sand that remained in the tubes after they had reached hard pan was removed by a sand pump. After a tube had reached hard pan, a pressure of 100 tons, the ultimate load that it was intended to carry, was put upon it. This was applied several times to make sure that the tube

placed under plates at the top of the chamber, but these were found to be too far from the tubes; then they were placed about 2 ft. above cap of tubes, as mentioned. When this was done the only function left for the plates at the top of the chamber was to jack against, and in one case they were omitted without any difference in the behavior of the wall, indicating that in sound walls they are superfluous.

The time consumed by the whole work can be divided into three parts of about a month each. One was occupied in shoring up the adjoining walls, another in building and placing the caissons, and the other in driving the sheetpiling, excavating, filling with brick and concrete, and placing I-beams and girders. The space occupied by the building is so restricted that there was practically no progress made while trying to combine under pinning and caisson work, or caisson work and sheetpiling, though the attempt was made with much additional confusion and expense, and with

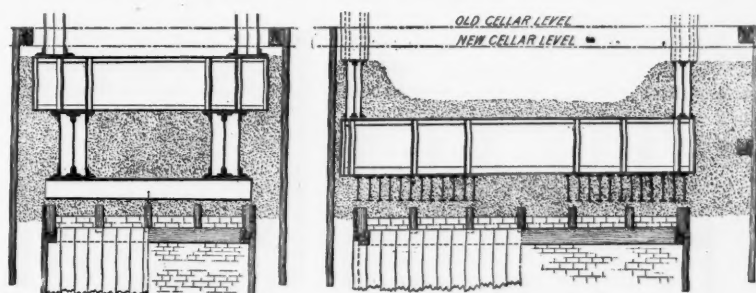


Fig. 4.—Grillage and Cantilevers, with Cofferdam Cut-off.

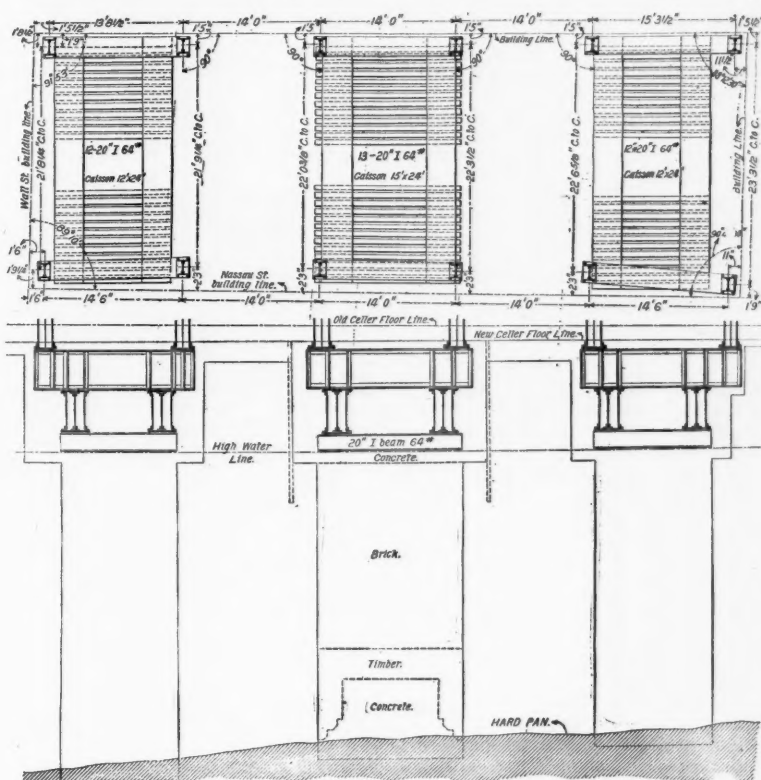


Fig. 1.—Plan and Longitudinal Section of Foundations—Gillender Building

weight of the building was finally transferred to the tubes by three pairs of 3-in. steel wedges 20 in. long, with a lift of  $\frac{1}{4}$  in. in 12, driven in between each pair of lintels. The wedges were driven until fine cracks appeared in the old brick walls near the tubes, thus showing that the new foundations were carrying the building. The foundations of the wall at the north were enforced by four tubes, and the wall at the west was supported by 10 cylinders.

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engines, ropes ran to two derricks conveniently situated in the pit, and from the compressors, iron pipes terminating in a flexible hose supplied air to the caisson being sunk at the time. The pile driver was used to drive the sheetpiling, and this was supplied with steam from the source mentioned through a hose.

The foundations to the bottom of the columns of the building were designed and built by Messrs. Stepuens & O'Rourke, engineers and contractors, 44 Broadway, New York. Mr. John F. O'Rourke, M. Am. Soc. C. E., and one of the contractors, was the Engineer in Charge. Messrs. Berg & Clark, 10 West Twenty-third street, are the architects, and Mr. Chas. T. Wills, 156 Fifth avenue, is the general contractor. The steel superstructure was designed by Mr. Henry Post, and was built by Post & McCord, 287 Fourth avenue, and is one of the best examples of that kind of construction in the world.

### The Cahaba Bridge Wreck.

The railroad disaster near Gurnee, Ala., killing over 20 persons, was reported in the *Railroad Gazette* of Jan. 1. From later reports it appears that the Cahaba River Bridge consists of five 60-ft. plate girders supported by metal towers with 30-ft. plate girders on top of the towers, and also of one 200-ft. Pratt truss deck span. The rail level is 110 ft. above the river. The bridge was built in 1891 by the Keystone Bridge Co., and is of modern design and of the best workmanship, calculated for two 90-ton consolidation engines, followed by a load of 3,000 lbs. per running foot.

The central span of 200 ft. with one 60-ft. girder on the east end and two 60-ft. girders on the west end, together with one tower, are down. The total length of bridge wrecked is 410 ft.

Within the last 60 days two careful inspections of this bridge had been made by competent bridge men, and it



was reported as in perfect condition. No positive conclusion had been reached after two days, careful study of the cause of the fall, but it seemed undoubted that a derailment caused the rupture of the lateral braces in the 300-ft. span east of the west pier. The engine fell west of the same pier at the base of the first tower of the long span. The engine was found lying on its side with the lever in the back motion.

The fireman, the only employee of the train who lived, reported a derailment, but gave no cause. Pieces of ties showed marks of derailment of the engine and cars.

The cars were burned up, and of the 23 people aboard only two lived. The surviving passenger is said to have reported robbery by two men before the fire destroyed the cars and the bodies, which would indicate the work of train wreckers. A careful search in the 18 in. of water in the river and around the wreck showed no money or valuables.

The bridge was inspected by a section foreman on Saturday evening at 6:30 and the train went down at 7:10 Sunday morning.

#### The Reno Inclined Elevator.

The utility of the Reno inclined elevator for handling passengers is now being tested at the New York end of the Brooklyn Bridge. A machine has been placed beside the second stairway from the street, in the covered bridge entrance. It was opened to the public on Dec. 28, and will be in operation 30 days. This test is to determine whether the machine will meet the requirements of the bridge traffic, and if it is satisfactory it is understood that permanent elevators will be placed at both ends of the bridge.

The elevator is the invention of Mr. Jesse W. Reno, and the patents and all rights are controlled by the Reno Inclined Elevator Company, New York.

The machine at the bridge had a two-weeks' test at the old Iron Pier, Coney Island, last September, and it is stated that during that test more than 75,000 passengers were successfully carried, and that not a single mishap occurred. It is now being used at the bridge for two hours every afternoon.

The elevator is made in either single or double width, for carrying one or two persons abreast. The inclina-

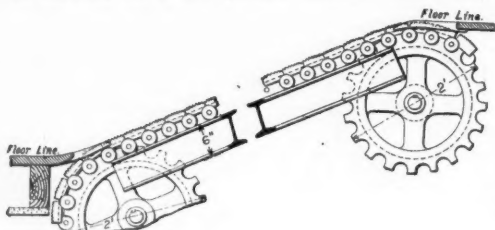


Fig. 1.—Part Side Elevation of Reno Elevator.

tion of the flooring and hand rail is 25 deg. Its speed is 80 ft. per minute, the sprocket wheels making 15 revolutions. It is driven by an electric motor, that for the machine now being tested being 4 H. P., and supplied with electricity from the same source as the bridge lights.

A part elevation of the single elevator is shown in Fig. 1, and Fig. 2 shows a front view of the driving sprocket wheel, with a sectional view of the flooring and supports, with the casing. The flooring of the single elevator is 22 in. wide and of the double elevator 44 in. It is made up of linked slats, which consist of rectangular iron castings 4 in. long and as wide as the flooring itself. The top surfaces of these castings are in the form of longitudinal ribs, as shown in Fig. 2. These ribs are

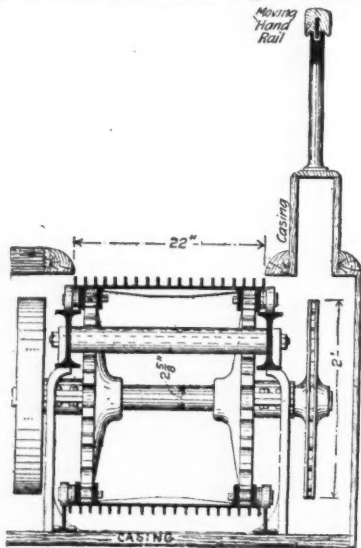


Fig. 2.—Driving Mechanism of Reno Elevator.

spaced  $1\frac{1}{4}$  in. center to center and are serrated on the tops to prevent slipping of the feet. The slats are supported at each side on small wheels, there being a pair of wheels at each joint, as shown in Fig. 1. These wheels travel on the top of two I beams. A new form of slats is proposed, and will be used on all machines built in the future; the base of each slat will be a thin steel plate, to which the separate ribs will be attached, being

so arranged that each rib may be replaced as becomes necessary on account of wear.

At both the upper and lower floor line are fitted steel landings, with comb-like projections, between the teeth of which pass the ribs of the flooring; in landing, the passenger is slid off from the elevator without shock or inconvenience.

The machine may be worked in either direction, but it is obvious that its greatest use would be in elevating passengers. The moving tread passes around both sprocket wheels, forming an endless chain, being carried underneath by rollers similar to those above. The machine is connected to the motor by means of a worm gearing, making it impossible for the machine to reverse its direction in case of an accident to the motor.

The single-width elevator has one hand rail only, while the double-width elevator has one on each side. This rail is essentially an endless chain, carried by two separate sprocket-wheels, and moves at the same rate of speed as the elevator floor. A cross-section of the rail is shown in Fig. 3. As will

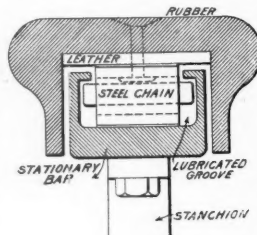


Fig. 3.

be seen, a stationary steel bar is rigidly attached to the stanchions. This bar has a groove on its upper side, which carries the endless steel chain, each link of the chain being provided with lugs which engage with projecting flanges on the bar, and prevent the chain from being pulled out. Above the chain is a strip of leather, and over all is placed a rubber covering, which is riveted to the chain links. The function of the leather strip is to preserve the shape of the rubber covering.

The capacity of the single-width elevator is 3,000 persons per hour, and of the double-width elevator 6,000 persons. The maximum number of persons crossing the bridge in one direction during the rush hours is 14,000 per hour. It is thus calculated that three double-width elevators at each end will be ample. The elevator company is now in communication with several railroad companies, with the view of installing these elevators in railroad stations.

#### Piece Work in Car Repairs.

At the annual meeting of the Southern & Southwestern Railway Club, at Atlanta, Ga., on Nov. 19, a paper was read by Mr. R. P. C. Sanderson, on "Piece Work in Car Repairs." An abstract of that paper is as follows:

The Pennsylvania Railroad it is believed was one of the first, if not the first, to introduce piece work into its repair shops. In 1887 the Norfolk & Western commenced piece work on some of its principal car repair tracks, and has continued this practice ever since. We have further extended the plan of working by the piece to other freight car tracks and into the machine shops, smith shops, foundry, passenger car shops and other departments.

I wish to impress on the minds of those that have not yet tried piece work for repairs that it requires far more watching, thoughtfulness and intelligent supervision on the part of the foremen and clerks than does the old plan of working by the day or hour. The conditions are constantly changing, and the piece work prices and schedules must change with the conditions, if they are to be fair and just to all concerned. It can be safely stated that none of the men or their foremen would willingly go back on day work at any of our principal shops.

One of the great advantages in piece work as compared with day's work concerns the employers, and is especially prominent where men have to work together in gangs of two or more, and where the money to be earned by all of them depends upon the speed, accuracy and skill of each individual. Under these conditions it is found that men will not work with a slow or lazy man.

Another advantage of piece work as compared with day's work applies directly to the man. A good man can get what he is worth without having to ask for an increase of the rate of pay.

When working day's work one of the most important things for the foreman to watch is to see that the men are actually working and accomplishing something all the time. He must also see to it that the work is properly done.

When working men piece work, the foreman is entirely relieved of the first responsibility, but he has an increased amount of responsibility in seeing that the work is done properly. There is a great temptation for men to do work and get pay for that which is not really necessary. If the cars to be repaired are simply distributed along the repair track, and the men turned loose on them, their work being subsequently taken for what they have done to the cars, it would result frequently in good parts of the cars being taken off and thrown away and replaced with new ones, so that the men could get pay for these, and they would work other schemes for increasing their earnings. All these things must be watched, and as a foreman cannot be all over the track at once, especially when he must handle a large number of men, the better plan is not to depend on the foreman's observations and watchfulness entirely, but to furnish a check so that irregularities of this kind cannot well occur. This is best done by the card system of giving out the work where a shop card is made out by the foreman or inspector for each car as it comes on the track, giving the detail of the car initial, number, and adding a list of the operations or work required on the car, with a space to the right for the insertion of the dollars and cents to be afterward added by the clerk. On the back of these cards is a space for the names of the men in the gang, and for special entries for material used in repairs of the car, where this has to be kept track of, for special reasons such as when repairing foreign cars to be charged to the owners. When the car is turned over to the gang who work on it they are given such a card, which is slipped into a tin holder fastened to

the car by wire. If additional work is found to be necessary they are not allowed to undertake it, nor will they receive pay for it, except after they call the attention of the foreman to this, and have him add the item to their card in his own handwriting. When the job is subsequently done, and the gang comes to the foreman for another car to work on they hand him a card. The foreman then at his convenience inspects the work, item by item, and if O. K., signs it as approved. If not O. K., the men are sent back to make the work right or suitable deduction is made, and they are notified. The card is then passed to the clerk, who, from the schedule of prices, places the price against each item, totals the card, and places it in the pigeon hole or rack under the name or number of the gang. This card afterward forms a very complete record of the repairs of each car in case future investigations are necessary, and it is used in computing the amount due each man on the pay roll at the end of the month.

Concerning the rating of the men in each gang, as before mentioned, it is the practice to allow them to choose their own friends for their companions in a gang. It is not, however, always practicable, especially when new men have to be added to the gang, to get expert men. In such cases it is usual to put one green man with each gang, and take one expert man from each gang to assist in making up new gangs. The men then agree among themselves, with the consent of the foreman, that they will pay the new man some definite proportion of their earnings, which goes on until the man becomes more expert, when by a similar agreement between the gang and the foreman the man gets his equal share of the earnings.

I would recommend to those who have sufficiently large car repair points to make it worth while introducing the piece-work system of work, and wish to prepare a schedule to proceed in about the following way, and it should be understood that nothing should be said about piece-work in advance, otherwise the men are apt to prepare for this by being slow over their work during the probation period. Services or shop cards should be prepared similar to those referred to above, and used in precisely the same way, except that instead of entering the piece-work prices on the sheet, the number of hours for each man should be posted on the card, and from these cards, say after a couple of months continuance of their use, an intelligent foreman with a clerk can compute the actual cost at that time of most of the principal operations which have been performed for car repairs under his supervision. There will be a large number of similar operations which he has not ascertained prices for in this way, but which his judgment will show him are worth either the same money or a certain amount more or less, which he can set by his judgment and knowledge of the work. After such a schedule has been prepared it is wise to continue to work by day's work continuing the use of the cards, and set against the piece-work prices ascertained as above, and compare the total for each car with the actual cost by hour's work. It is sufficient to say that it will be found that for men who are known to do their work quickly and well the average prices ascertained as above can be cut at the start about 20 per cent.

After this has been done, and the schedule carefully revised, so as to get it as near right as possible at the start, the men can be put on piece work, and it will be immediately found that some men can make good wages and an average month's earnings at beginning, and others can hardly make \$1 per day, although they may be working and fussing, and apparently doing their utmost, and in this way the skillful and good men get the wages that they are worth, and those men who are less skillful, and less industrious, are paid according to their performances.

It is a wise plan before starting to work piece work to give the men a few days' warning, and allow them to group themselves into gangs. They know very well which of their companions are hard workers and which are not, and it will be found that the industrious men will group themselves into gangs, leaving the drones for the other gangs. It is better to do this at the start, because it will soon be found that the hard workers will make more than their averages have been at a daily rate, which will be a reasonable argument when the men who only can earn \$1 a day come and claim that the prices have been set too low.

#### The Carnegie-Rockefeller Agreement.

No single event of such importance to the iron and steel trade has taken place in years as the recent Carnegie-Rockefeller agreement. The Carnegie Steel Co. leases at a royalty of 25 cents a ton the ore deposits of the Mountain Iron and Rathbun mines of the Lake Superior Consolidated Iron Mines (the Rockefeller company) for 50 years; secures a low through lake and rail rate to Lake Erie ports on Rockefeller rails and ships on the ore mined, and secures an agreement from the Rockefeller interests that they will not enter the field of the steel manufacture for an indefinite time. It means that Mr. Rockefeller has decided to confine himself largely to the carriage of ore while still mining from other properties on the Mesaba and Gogebic ranges.

In this respect it is of importance to the steel trade, but its influence in other ways is even more considerable. For Bessemer steel low phosphorus ore is necessary. The Carnegie Steel Co. controls the low phosphorus ore Pewabic mine, on the Menominee Range, in Michigan; it also controls the Oliver mine, on the Mesaba, from which it mined over 800,000 tons this year at a cost of less than 10 cents a ton, and whose ores, though not all alone suitable for Bessemer steel, can be made so by the admixture of the higher priced Pewabic. The Mountain Iron, a better ore than the Oliver, and one that can be mined even cheaper, can be made a first-class Bessemer by admixture. The extent of the ore deposit of the Mountain Iron can be in part understood when it is stated that it has already taken off the surface earth from more than 27 acres on all of which the ore lies at an average depth of about 80 ft., and can be mined with steam shovels. The Carnegie company also controls three-fourths the Connellsville coke output. So much for the probabilities in low-priced raw material.

This company has been building a new blast furnace plant at Duquesne, and will have four furnaces in operation there as soon as possible. No. 1 furnace, already in operation, made in November a daily average of



572 tons of standard Bessemer pig iron, something then unprecedented. This entire furnace plant is designed to make iron in larger quantities and at less cost than anywhere else. It is understood that only about 1,600 lbs. of coke are required to smelt a ton of iron at these furnaces, a lower ratio by 10 per cent. than customary in good furnaces. The same company is also constructing 16 open-hearth furnaces of modern design, for making

an hour. The locomotive was delivered at New Haven Dec. 3, and on the 11th was put into operation on the line. Since that date it has been handling the entire movement of the cars between the factories and the junction. The dimensions of the locomotive are as follows:

Weight..... 58,000 lbs.  
Drawbar-pull..... 7,060 lbs.

a pneumatic governor, consisting of a cylinder containing a piston working against a spring. The action of this automatic control is as follows: A pipe running from the main reservoir enters the cylinder below the piston. As the pressure rises the piston is forced upward against a spring. The other end of the piston rod carries the contacts through which the pump motor circuit is made and broken. When the pressure falls below

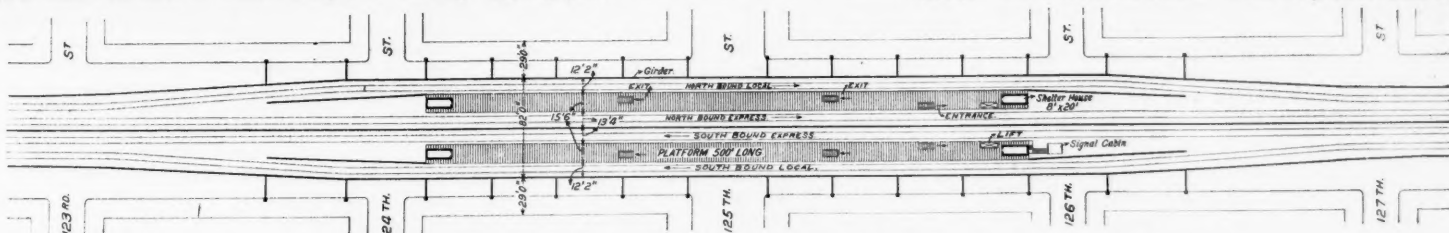


Fig. 1.—General Plan of Viaduct at 125th Street Station—New York Central Track Elevation in Park Avenue, New York.

steel from off-Bessemer ores, of which there are great quantities in its Mesaba mines, and which have heretofore been worthless. They not only could not be used economically but had to be moved out of the way. With the new furnaces it will have 36 of these furnaces. The Carnegie company will be able to produce basic open-hearth steel at about the same price as Bessemer.

By spring the Rockefeller lake ore fleet will have a season's carrying capacity for about 2,000,000 tons of ore, about what the Carnegie company will require from the Mesaba alone; the latter has let contracts for the construction at Conneaut, O., of ore and coal docks 3,200 ft. long, for it is building a new road, to give it a new route between Pittsburgh and Lake Erie, which it is equipping with 100-lb. rails, 120-ton locomotives and 100-ton cars, and on which it expects to haul ore to Pittsburgh for less than 50 cents a ton at a profit. Its central position for reaching the American markets, the improved Erie Canal for getting its products to tide-water, and its projects for so improving the Ohio waters to reach the Mississippi and the Gulf, give it such a commanding position as will enable it to go into the markets of Europe and Asia on a very large scale.

All these plans put the Carnegie Steel Co. ahead of any rival concern. It will also probably put a stop to any movement of steel plants to the shores of Lake Erie, the only possible competitive point now being at the head of Lake Superior, for the trade of the West.

#### An Electric Switching Locomotive.

The electric locomotive recently purchased by the Manufacturers' Railroad, of New Haven, Conn., is in constant service switching freight cars between the main line of the New York, New Haven & Hartford and a number of factories located along the river front. The line over which it works is about two miles long and is the property of several large manufacturers, among which are the Bigelow Company, manufacturers of boilers; the National Pipe Bending Co., and the New Haven Rolling Mills. It starts at the tracks of the N. Y., N. H. & H. R. R., at Cedar Hill Junction, about one mile from the New Haven passenger station, and follows a devious course, throwing off sidings at different factories. The track is of steam railroad type, with heavy rails, well ballasted and provided with switches and turn-outs. There is a 2½ per cent. grade against the load both ways.

Hitherto freight engines of the N. Y., N. H. & H. have dropped the cars at the junction, whence they were hauled to the factories by horses. In looking for a bet-

Length over drawbars..... 16 ft. 6 in.  
Height over all..... 11 ft. 6 in.  
Width over all..... 8 ft. 3 in.  
Wheel-base..... 5 ft. 6 in.  
Diameter of drivers..... 44 in.  
Number of drivers..... 4  
Size of journals..... 5½ x 8 in.  
Gage..... 4 ft. 8½ in.  
Voltage..... 500  
Amperes at full speed and normal draw-bar pull..... 600  
Amperes at half speed and normal draw-bar pull..... 300

The two gearless motors are supported on spiral springs resting on the side frames of the truck. The suspension being entirely upon springs, the wheels are free to adjust themselves to the irregularities of the road-bed. The armatures are of the ironclad type and each armature, with its commutator, is on a sleeve, through which the axles pass. The sleeve rests in bearings on the motor frame. Two projecting arms from the sleeve fit

that at which the automatic control is set, the spring forces the piston down and the circuit is broken. Any arcs that may be formed when the contact is broken are blown out in the magnetic field. The locomotive is provided with a chime whistle blown by compressed air and a railroad headlight is placed on each shield. Beneath each of the shields is an iron sand box provided with a pneumatic feeding device.

The locomotive responds immediately to the motion of the controlling lever, and it can be backed up to a freight car for coupling as gently as the movement of a hand. One of the difficult duties it has to perform is kicking the freight cars over the curves in the New Haven Rolling Mill where there is one with a radius of 50 ft. The locomotive can handle seven loaded cars around this curve without any difficulty. Six loaded



Electric Locomotive for Switching Purposes at New Haven.

into an iron plate loose upon the axle, and similar projections from the wheel enter the plate from the other side, so that, as the armature revolves, the wheels are revolved also. This coupling, being flexible, allows freedom of motion.

The controller is the L2, series-parallel type, arranged for the control of two motors. It is of the same general type as the K2, used to a considerable extent on electric street cars, and is provided with separate reversing switch and the magnetic blow-out. The resistances are set beneath the shields, and are of the packed ribbon type. The automatic circuit breaker is of 500 amperes capacity, and involves also the magnetic blow-out principle, as does also the lightning arrester, which is on the floor of the cab behind the controller. In the front of

cars were hauled up the steepest grade by the locomotive with the slack all out, the start being made on a grade of about one per cent. Only 150 amperes were required to start this heavy train and it moved off smoothly.

#### New York Central Track Elevation in Park Avenue, New York.

The elevation of the New York Central & Hudson River Railroad tracks along Park avenue, in New York, was practically completed in March, 1895. The new steel viaduct had been finished, and rails laid the entire length, when legal proceedings by property owners at and near 125th street put a stop to operations.

The *Railroad Gazette*, on April 12, 1895, described in considerable detail the work which had been done, and contained a number of illustrations of the work.

The railroad tracks leave the tunnel at Ninety-eighth street, and heretofore have been carried from this point to 115th street on a masonry viaduct; at 115th street they entered an open walled cut, which extended to 132d street, about two blocks south of the river. The masonry viaduct ascends to 106th street, and then descends again to the open cut. The change of grade in the new work was then begun at 106th street, and masonry has been added to the present structure so as to make an ascending grade from that point of the same rate as it previously descended, that is, .75 per cent. In this way, the masonry viaduct was used as far as 111th street, the iron work being begun at 110th street, and the girders carried on short posts resting on the existing stone work, to 111th street. The new iron viaduct extends from here northward to the Harlem River, at which point the total elevation reached is 16 ft. above the old roadbed, which amount is the difference in headway between the old and new drawbridges, the new bridge having a clearance of 24 ft.

Beginning just above 106th street a temporary timber trestle was built out on each side of the viaduct, each trestle carrying two tracks and over these tracks all trains have been run since the work was begun. This temporary trestle extends to a point between 113th and 114th streets, where the tracks are brought under the viaduct and then enter the existing cut. As soon as regular train service begins over the viaduct, this cut will be filled and the street paved over above. The center line of girders is now supported on heavy false-work, timber trusses, which span the cut from 113th street north to the river. The center line of posts cannot be built until the trains have been taken out of the cut. Further details, and a considerable description of the

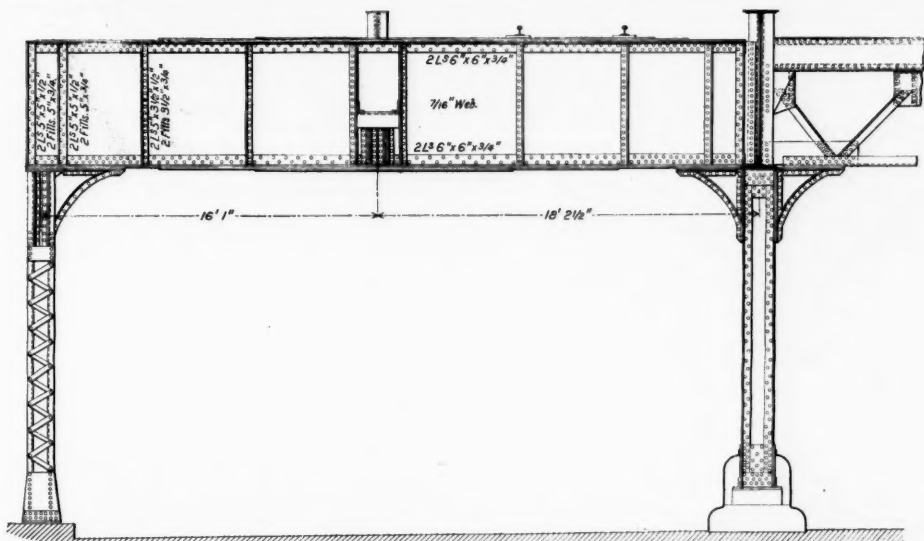


Fig. 2.—New Cross Girder—New York Central Viaduct.

ter method the steam locomotive was rejected, for the reasons that the line runs for some distance along a frequented thoroughfare, and because the engine would stand idle under steam for a large part of the day. Electric traction was adopted and an order was placed with the General Electric Company for a 30-ton locomotive, which the company guaranteed would haul two loaded freight cars up a 2½ per cent. grade at seven miles

the cab and above the controller is a circular diameter meter reading to 500 amperes, and facing the motorman is the air-pressure gage. On the other side of the cab, opposite the controller, is an oscillating cylinder air pump, driven by a motor. This furnishes air to two air tanks suspended beneath the cab, and is automatic in its action.

The air-pressure pump is controlled automatically by



structural iron work, its support and method of putting together, are given in the article above mentioned.

On February 21, 1896, the *Railroad Gazette* described and illustrated the new four-track drawbridge over the Harlem, said to be the heaviest bridge of its kind in the world. This bridge has a head-room of 24 ft. above maximum high water, thus allowing all small boats to pass,

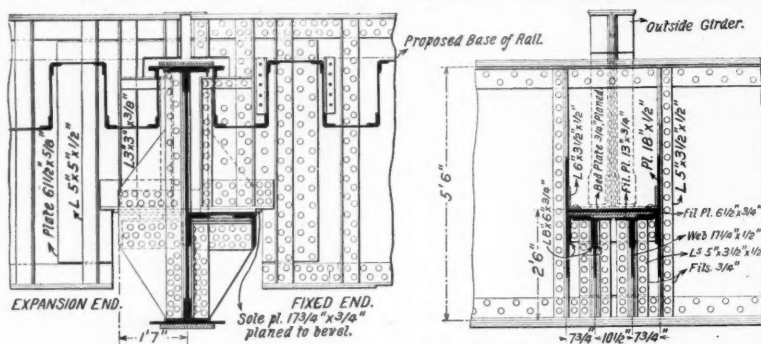


Fig. 3.—Details of Pocket in New Cross Girder.

and greatly reducing the number of times it is necessary to open the draw.

The bridge consists of a four-track pin-connected swing span, of the Pratt and subdivided Pratt type, and two approach spans on the north side of the river, one being 131 ft. 4 1/2 in. long, and the other 185 ft. 4 1/2 in. long. The swing span is 400 ft. long over all, with a total width of

tractor for the metal work was the King Bridge Co., of Cleveland, O., which sublet the contract for the erection to the Terry & Tench Construction Co., of New York.

The original plans for the track elevation in Park avenue provided for widening the viaduct at 125th street, to provide for the station at that point, and the structure was at first built on those plans. The normal

positions of the original sidewalk posts and of the new cross girders. Fig. 2 shows one of the new cross girders, with its supporting posts and the pocket near the center for supporting the sidewalk girder. Fig. 3 shows two detail views of the connection of the sidewalk girders to the cross girders and the construction of the supporting pocket is here shown more clearly.

This narrowing of the viaduct made it necessary to change entirely the plans for the 125th street station, which will now be placed directly underneath the structure, and on the street level. Figs. 4 and 5 show a general plan and front elevation of the station as now proposed, and in Fig. 1 is shown the position of the station platforms. Stairways will lead from station to platform, there being four exits and two entrances. There will also be two lifts for baggage only. As may be seen in Fig. 5, the foundations will be carried down to the level of the roadbed in the present cut, 15 ft. below the street level; this will be necessary in order to give stability which could not be obtained in the filled ground.

A clause in the law which compelled the narrowing of the structure at this point provides that after regular train service has been begun over the viaduct, certain express trains, both outgoing and incoming, which do not now stop at 125th street, shall make regular stops at that place. Work on the station cannot be begun until the trains begin running over the viaduct, as it will be necessary to first fill up the cut underneath, but a temporary shed and ticket office, with the necessary stairways, will be built, to be used until the permanent station is completed.

The narrowing of the viaduct has greatly restricted the space for the station platforms, and it has been

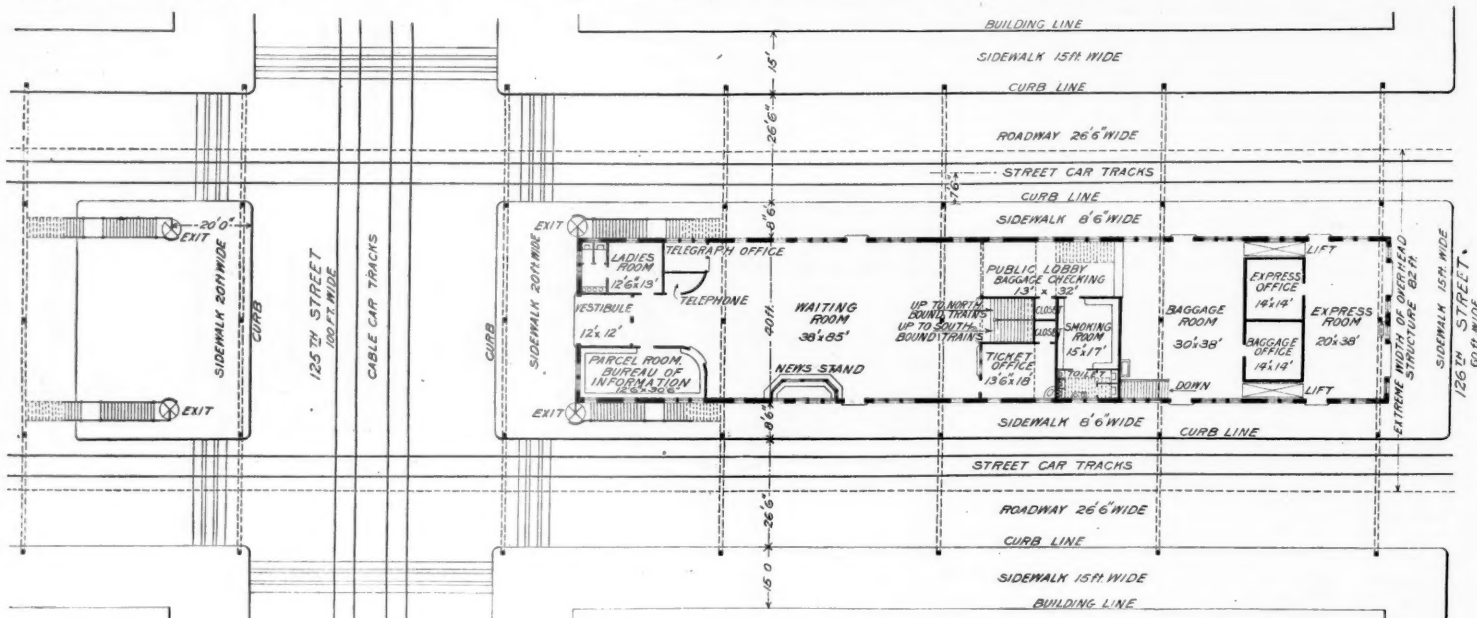


Fig. 4.—Plan of Station at 125th Street, New York—New York Central & Hudson River Railroad.

58 ft. 6 in.; when open it leaves two 100-ft. clear channels in the river.

The power for turning the draw, and for raising and locking the ends is furnished by two 50-H. P. oscillating steam engines, built by Joseph Edwards & Co., of New York. Under ordinary circumstances both engines will be used at once, the time for opening or closing the bridge being about 1 1/2 minutes, but a system of compound gears is provided, by which one engine may be

enough brought the structure about 2 ft. over the sidewalk on each side, the outer line of posts being placed inside the curb. This brought the outer line of girders very close to the windows of the abutting buildings and was the cause of protests from the property owners and of legal proceedings against the railroad.

Finally, in May, 1896, a law was passed, by the provisions of which it was made necessary to reduce the width of the viaduct. Plans for this were accordingly

found necessary to place the platforms on top of the girders, as shown in Fig. 1. The original plans provided for four platforms, but the modifications which have been made left room for only two, as shown, one between the two northbound tracks and the other between the southbound tracks. The platforms, in order to be placed on top of the girders, as stated, had to be raised 11 in., and this necessitated raising the tracks by the same amount. To do this the flooring of the viaduct

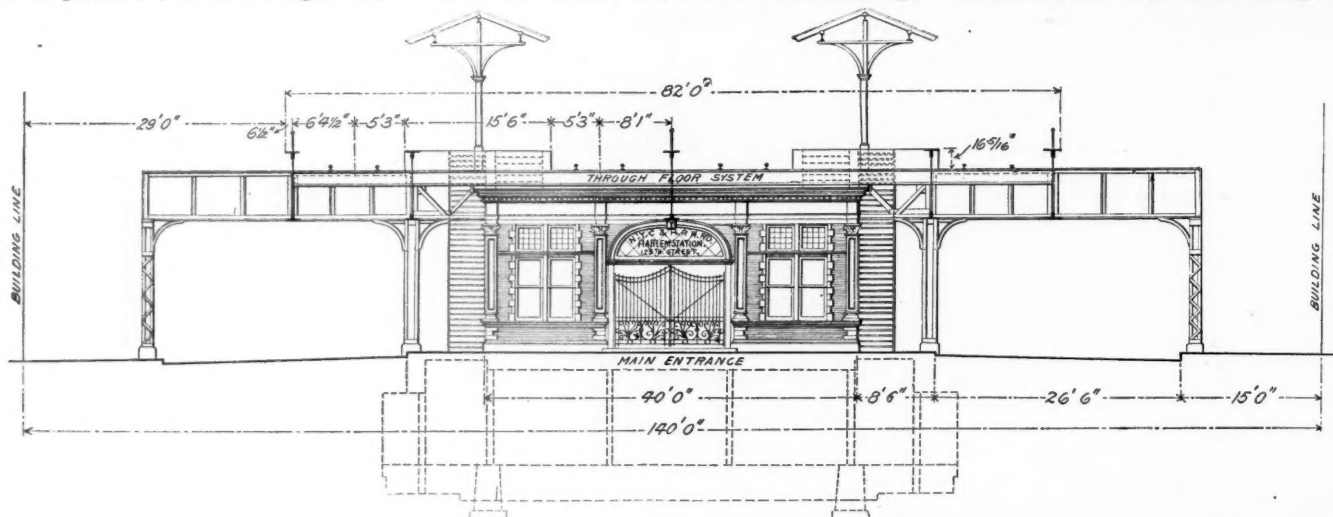


Fig. 5.—Front Elevation of New York Central Station at 125th Street.

used alone if necessary, giving the vertical shaft about one-half the regular speed.

The details of the bridge, and particularly of the device for raising and lowering the ends of the draw and for locking the draw, are given in the article mentioned. The work of erection was begun May 15, 1896, and the draw span itself on Aug. 1 of the same year. The structure was completed in May, 1896. The con-

made, and dated June 12, 1896. The work began on July 20. The two outer lines of posts were allowed to stand in their original positions, but the sidewalk girders on each side were moved 16 ft. 1 in. toward the center girders. They are now carried by new cross girders, which are in turn supported on the sidewalk and side posts. A general plan at this point is shown in Fig. 1; here the lines of the modified structure as now built are shown, and also the

was raised bodily from a point a little north of 124th street to the south side of 126th street. On either side of these two points the track, when laid, will be raised gradually from the buckle plate flooring by means of fillers placed between, until the required elevation of 11 in. has been gained.

The method of raising the viaduct flooring was ingenious. A light traveler was used, being so arranged



as to run on a temporary track placed on the tops of the girders. From the framing of this traveler, clamps were dropped, which too, a firm hold on the buckle-plate flooring; the rivets which supported the flooring from the webs of the girders were then cut, and six hydraulic jacks, two on each girder, were put in play under the traveler, raising the flooring the required distance; the new rivets were then put in, new holes having been previously drilled in place in the girder webs. In this way, sections of from 10 to 14 ft. long were raised at a time, the traveler being moved along the tops of the girders from one section to another, by means of a small winch. This work of raising the flooring has all been

constructed the beautiful Park Square station, was consolidated with the Old Colony system, there has been a disadvantage in the separation of that station from that of the Old Colony road on Kneeland street. This disadvantage, however, did not become prominent until both roads and the New England system were all brought under the control of the New York, New Haven & Hartford road some two years ago. Then it became a question of which terminus should yield to the other. The Park Square has the reputation of being not only the handsomest but also the most conveniently situated of all the Boston stations; but it had the disadvantage of being isolated, as it was placed more than half a mile

months after the Terminal Company has filed its first location of land, by the Boston & Providence Railroad Corporation and the Boston & Albany Railroad Company, of a new station or stations at Dartmouth street, to take the place of the Park Square station, and for the subsequent abandonment of the Park Square station and adjacent tracks, as above mentioned.

The general plans of the new South Terminal, according to the requirements of the charter, have been submitted to the Mayor and received his approval on Dec. 22. They were then sent to the Railroad Commissioners, who gave a public hearing, beginning Tuesday, Dec. 29. The objections brought to the plans turned

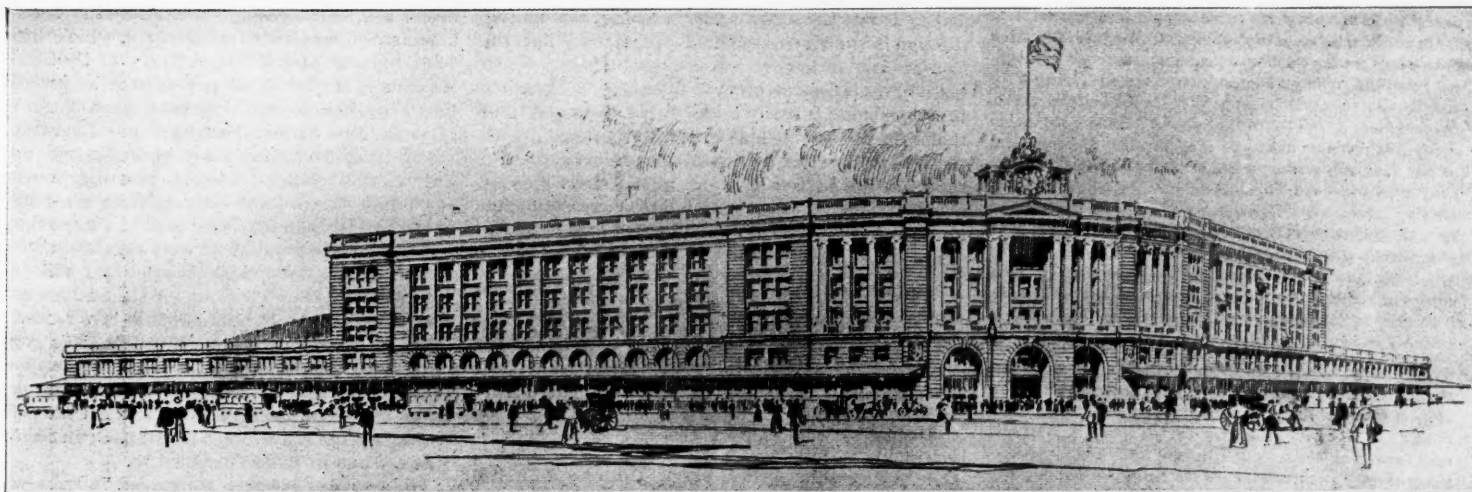


Fig. 1.—Perspective View from Federal Street, Proposed New South Terminal Station, Boston.

completed, with the exception of some last riveting, which is now being done.

The rails will be relaid over this part of the viaduct within a short time, and when that has been done the viaduct itself will have been practically completed. Work has already been begun for the temporary station at 125th street. At 110th street very little alteration in the station arrangements is to be made. Two platforms have been built, one on each side of the viaduct and at the new level. These platforms will be connected with the station below by means of stairways, and no alteration is proposed to the station building itself.

The elevation of tracks has necessarily been carried on above the Harlem River, the grade falling until it rejoins the old level, but here no adverse conditions such as those in Park avenue were found, and nearly all of the elevation has been made by means of embankments. At Mott Haven, the present station, a brick building, is to remain as it is. Platforms have been built at the new track level, and access will be had by means of stairways as at the 110th street station.

The changes which have been made in narrowing the viaduct at and near 125th street have been carried on under the direct supervision of Mr. E. B. Katté, and it is to him that we are indebted for the drawings from which the accompanying illustrations were made. No definite date has as yet been fixed for beginning train service over the new structure, but we are informed that it will probably be about the middle of February.

#### The New Union Terminal Station at Boston.

(Continued from Page 4.)

Fig. 1 shows a perspective view of the new South terminal station as it will appear from Federal street when completed. The main entrance, 92 ft. in width, is crowned by an arch reaching to the third floor, and surmounted, at 100 ft. from the street level, by a clock-dial 14 ft. in diameter. The facade will be of stone and brick, principally the former at the Federal street corner. It is composed, as shown in the perspective view, of a series of three great semi-circular arches reaching to the third floor, surmounted by a colonnade of massive columns 4½ ft. in diameter, reaching up to the cornice, the top of which is about 97 ft. above the sidewalk, with a parapet extending 8 ft. higher. Fig. 2 is a transverse section of the roof of the train-shed, and is the figure referred to last week in our description, near the top of page 4.

The Terminal Company estimate the total cost of the new terminal at about \$10,000,000, with a possible excess of this amount of 10 or 20 per cent. Of this, about \$3,000,000 will be for construction and the remainder for real estate. The company has already purchased a large amount of the land, having sold \$6,000,000 of its bonds for this purpose, and secured authority to issue \$2,000,000 more. Much alteration of the land will be necessary, including the filling up of the old docks, and removal of buildings; and, in addition, the City of Boston will expend about \$1,000,000 in construction of streets, bridges and a sea-wall along Dorchester avenue. But these are the expenses which will be immediately rendered necessary about the grounds of the new terminal, and do not include some extensive alterations in another portion of the city, of which we shall now speak in a brief review of the circumstances leading to them, which will be of interest to those of our readers not already acquainted with them.

Ever since the Boston & Providence Railroad, which

from the nearest of the other southern termini, all of which were grouped together on or near the ground now owned by the Boston Terminal Company, and within a quarter of a mile of each other. There was the added inconvenience of the crossing at grade of the Boston & Albany and the Providence tracks, near Dartmouth street. To locate a Union Station at Park Square would necessitate carrying the New England and Old Colony roads a long distance across expensive land in the southern portion of the city, as well as altering the Boston & Albany so as to run parallel to the Providence road; while, on the other hand, the present location, besides offering an indisputable advantage in its proximity to South Boston, itself a city of considerable size, necessitated no essential alteration in any tracks except those of the Boston & Providence. Nevertheless, an effort was made to obtain the Park square site, but it had to be abandoned on account of the impossibility of obtaining the necessary space for even present needs at a reasonable cost. The plans, as at present outlined, involve the removal of the station and all existing tracks between Dartmouth street and Park square, and the sale of the land to the city. Certainly it is to be regretted that this beautiful landmark, built only twenty years ago, will soon be a thing of the past.

entirely on the question of the grade of the tracks, with reference to a passage for teams over or under the company's property from Kneeland street to Dorchester avenue, in place of the foot-bridge at present provided for. The plans, however, have been approved by the Railroad Commissioners as they now stand, by an order issued last Monday. The consent of the Federal government to the harbor-line changes has also been granted, and that of the Harbor and Land Commissioners is expected shortly. The minimum time estimated for the construction of the new station is a year and a half to two years.

The Boston Terminal Company is governed by a board of five trustees, one appointed by each of the five associated roads. They are: Charles P. Clark, representing the N. Y., N. H. & H. R. R., Chairman; Samuel Hoar, B. & A. R. R., Vice-Chairman; Charles L. Lovering, Old Colony R. R.; Francis L. Higginson, N. Y. & N. E. R. R.; Royal C. Taft, Boston & Providence R. R. Officers: John C. Sanborn, Manager; Charles F. Conn, Treasurer; Geo. B. Francis, Resident Engineer; James W. Perkins, Clerk. It is but just to state that the credit of the engineering features of the new station, which have been developed in a remarkably short space of time, belongs almost wholly to Mr. Geo. B. Francis, M.

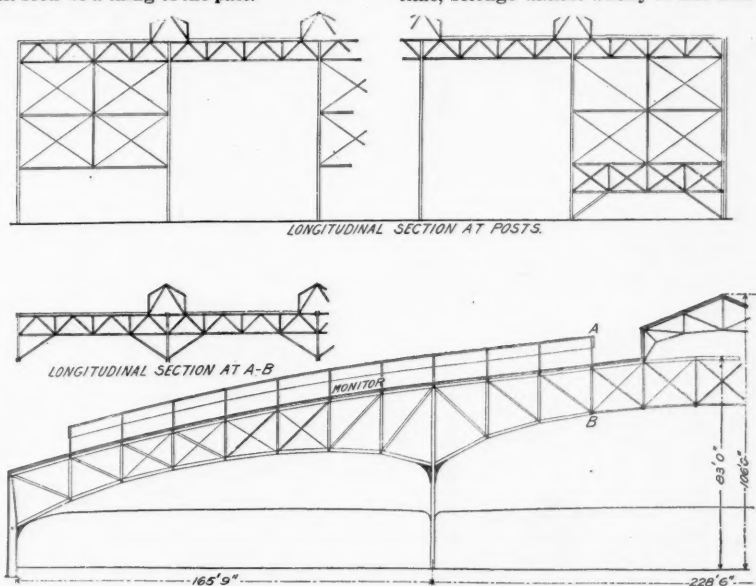


Fig. 2.—Sections of Roof of Train Shed, South Terminal Station, Boston.

The scheme for the great terminal described in this article was set on foot last February. The location having been selected, one where all the necessary land could be obtained at a cost not excessive (most of it was already owned by the associated roads), preliminary plans were drawn up and presented to the legislature, in order that permission might be obtained to put the scheme through. This was presently done, the Boston Terminal Company being incorporated by an Act of the General Court, June 9, 1896.

The charter of the Boston Terminal Company provides, in part, for the location of grounds, tracks and streets, and the taking of public and private land in the city of Boston. It also provides for the initiation, within six

Am. Soc. C. E., in consultation with the chief engineers of the various roads, and the Board of Trustees and Manager of the Terminal Company. The architects are Messrs. Shepley, Ruten & Coolidge.

**The New Dry Dock at the Brooklyn Navy Yard.** It is expected that the new timber dry dock at the Brooklyn Navy Yard, which has been under construction for the past three years, will be completed by Feb. 1. The new dock will be the largest on the Atlantic coast, and two of the largest battle ships will be able to float in it at the same time. It is 658 ft. long and 64 ft. wide, and has a mean draught at high water of 28 ft. The cost has been about \$800,000.





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## EDITORIAL ANNOUNCEMENTS.

**Contributions.**—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to all departments of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

**Advertisements.**—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns our own opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

We learn from Mr. Swank that the rails rolled in the United States in 1896 amounted to about 1,100,000 tons. This is, however, only an approximate estimate. The product in 1895 was 1,300,000 tons. In 1887, when we built 13,000 miles of new railroad, we rolled 2,140,000 tons of rails, which was much the greatest output in one year. Last year the new road was about 1,700 miles; and assuming 300 miles more for sidings, we have a total of 2,000 miles of new track. This would have absorbed, estimating on 65-lb. rail, about 200,000 gross tons, leaving 900,000 for renewals. The Interstate Commerce Commission gave the total track in the United States on June 30, 1895, as 237,000 miles. Let us say, for ease in estimating, that a year later it was 240,000 miles and that the average rail was 60 lbs. per yard. Then the total tons (gross) in track would have been 22,560,000 and the tonnage of rails available for renewals (900,000 tons) was about one-twenty-fifth of the total. It is safe to say that this is not half enough to keep the tracks in good condition. It is impossible to say how long the average rail lasts; but 12½ years would be a long life for some tracks and a short life for others, and may not be far from a proper average. This whole estimate turns, it will be observed, on several free guesses; first, that the average of new track is 65-lb. rail; second that the average of all track is 60-lb. rail, and third that the average life is 12½ years, and we only put it out as a starting point for some one who has more accurate knowledge. From him we shall be glad to hear.

We read in a Kansas City paper that "shippers and receivers of that city have started a movement through their transportation bureau to have the jurisdiction of the Kansas City Car Service Association extended so as to include the cities of St. Joseph, Leavenworth and Atchison. Shipments of merchandise and grain are being diverted from Kansas City to the cities named because in those places shippers are practically allowed to unload cars at their leisure." This complaint of discrimination is not different in principle from hundreds of others that have been made, but we make note of it because it is so different in spirit from nearly every other that we ever heard of. Instead of asking that a wholesome railroad regulation be abandoned, that they may get their due, they ask to have it made more effective. We are not much acquainted with Kansas City merchants but we venture to guess that this adoption of the right instead of the wrong method is to be credited to their wisdom in establishing a freight bureau, and in consistently maintaining it (for now about seven years, we believe) with a competent ex-railroad officer at its head. In this, as in most business matters, success often depends upon the personality of the chief executive officer, and that element, at Kansas City, seems

always to have been satisfactory. We have not carefully followed all the doings of this bureau, but such matters as we have noticed have been handled with moderation and reason; and, we presume, with all necessary aggressiveness. This action in reference to demurrage corroborates the statements of numerous demurrage managers, that consignees really like good demurrage regulations, after they have once got used to them. The average consignee is so persistently blind to any good in a railroad regulation that we have always been tempted to season these statements of the managers with a grain of salt before we swallowed them; the manager was so likely to be viewing the matter through his own rose-colored spectacles. But the Kansas City men have no reason to say that the new regulation, necessitating prompt unloading, is agreeable to them unless it really is so. It is to be hoped that the railroads will be able to promptly comply with their request. The item we have referred to says that the Burlington brought into Kansas City an average of 70 cars of grain daily for 14 days, and that all were promptly unloaded.

American makers of machine tools have long been active and formidable competitors in the markets of Europe, but the recent invasion of England with tools for making bicycles, especially by the Pratt & Whitney Co., has caused something like alarm. Many special tools made by that firm were exhibited at the recent National Cycle Show and attracted much attention because of their accuracy, their efficiency and the ingenuity of their design. One of our English contemporaries devotes several pages, in two different issues, to descriptions of some of these tools, and says that the Americans are reaping a rich harvest by selling, pretty well at their own price, special cycle-making tools which cannot be bought of British makers. The editor undertakes then to explain why the American has shown so much more promptness and originality in seeing and meeting this demand. He thinks it evident that the English mechanic could have made the machines if he had thought of them. But why did he not think? That seems to be largely a sociological matter. The control of English works, making machine tools, is largely in the hands of prosperous men who send their sons to schools where mechanical ingenuity is unhonored and where the important knowledge seems to be the politer branches of learning. The young man so trained passes a little time in the shops, where he sees designing entirely in the hands of subordinates, and where the notion is confirmed in his mind that designing is a subordinate part of the work of the concern; and so he gradually takes the business control of the establishment with such theories well fixed in his mind. Furthermore, those makers of machine tools now active, who began in the shops and worked up by their own good qualities of mind and character, are not now suited to take a leading place in their business for want of the broader education which the modern mechanical engineer gets. On the other hand, the English editor is disposed to think that the democratic customs and habits of our people result in the eventual control of the works by men who have knowledge of and sympathy with the men in the drafting-rooms and the mechanics in the shops, because they played with them as boys and sat by their sides in the public schools, and have the habit of treating them as intellectual equals. Consequently, ability as a draftsman, a designer and a machinist has higher rank here than on the other side of the water, and the men who have this ability have more to do with directing the policy and the daily practice of the shops. Perhaps this is all true. At any rate, it is an interesting speculation, and it is gratifying to think that American industry has taken so high a place abroad as the result of applied skill and sound business methods.

## The Railroads of India.

British India has only about one sixth as much railroad as the United States relatively to the area of the country and only about one-fourth as much relatively to the population. That is, in India there is 0.6 mile of railroad to every 10,000 people, and in the United States there are 26.2 miles. The greatest development of Indian railroads is in a region having over 500 people per square mile, and nearly all of the system lies in country having over 180 people per square mile. But the population of the United States amounts to less than 22 per square mile and even in Massachusetts it rises only to 280, while great regions of India have a population of over 800 per square mile. When we consider these facts, and the further fact that the average passenger rate in India is only about one-sixth of our own, we should expect to find there a far more dense passenger traffic.

Consulting the administration report on the railroads of India for 1895, we find that for that calendar year the average miles of railroad worked in India amounted to 19,160, and the passenger movement on this system amounted to 322,000 passenger-miles per mile of railroad worked. The standard-gage line was something over 11,000 miles, and on this the passenger movement amounted to more than 368,000 passenger-miles per mile of road. In the year ending June 30, 1895, the railroads of the United States carried on the average 68,572 passenger-miles per mile of road—that is, less than one-fifth the traffic per unit of line of the standard-gage system in India. The railroads in that territory classified by the Interstate Commerce Commission as Group 3, which includes Ohio, Indiana and Michigan south of the Straits of Mackinaw, carried 76,582 passenger-miles per mile of line. In Group 2, which includes New York, Pennsylvania, New Jersey, Maryland and Delaware, the volume rose to 178,248 passenger-miles per mile of line. In this populous group the passenger movement per unit of railroad line was less than one-half that of the British India standard gage. In Massachusetts, however, where the railroad worked in 1895 amounted to 2,114 miles, the passenger-miles per mile of railroad were 375,945. There we see the traffic was more dense than that of Indian standard-gage roads.

The rate of fare per passenger-mile in India averaged 0.13 rupees. Taking the gold value of the rupee for that year as 26 cents, this rate was, in our money, 0.338 cent. The average rate in the United States was 2.04 cents; in Group 3 it was 2.08; in Group 2 it was 1.82 and in Massachusetts 1.78.

The average passenger train load in India was 150 and in the United States in the same year it was 38. The trains in India carry immensely heavier loads of passengers and they run slower and at less frequent intervals, which explains how it is possible to make such extremely low rates. Indeed, a great deal of the passenger business in India is done under conditions which could not be observed in the United States. Cars of the lowest class often have two decks, and even for long journeys the natives are closely packed in cars having no seats or mere benches.

The freight service compares in the two countries quite differently from the passenger service. In the United States the number of ton-miles carried per mile of railroad was a little more than 479,000; in India it was 260,100. The rate, however, was nearly the same in both countries; in the United States it was 0.839 and in India it was 0.858 cent per ton-mile, still taking the value of the rupee at 26 cents. It is quite natural that the volume of tonnage should be relatively less in India, for the people there produce very much less per head of population. It is also natural that the average rate should be higher so far as the kind of traffic affects it, for in India the volume of coarse freight taking very low rates would be relatively less than in this country; coal and iron ore form there nothing like so large a percentage of the total volume of freight. All the coal produced in India in 1895 was but 3,167,000 tons. If the total traffic of the railroads of the United States had been done at the average Indian rate they would have earned in 1895 \$207,000,000 less from passenger traffic and \$16,000,000 more from freight, or \$191,000,000 less than they actually did earn.

We have said that the average miles worked in 1895 were 19,160. The total open for traffic at the end of that year was 19,678. The total miles open at the end of each five years was as follows, the figures being taken from a diagram, and therefore subject to some correction:

	Miles.		Miles.
1855.....	200	1875.....	6,500
1860.....	850	1880.....	9,150
1865.....	3,300	1885.....	12,400
1870.....	4,800	1890.....	16,000

The net increase of miles open in the year ending March 31, 1896, was 822½ miles, and the total "sanctioned" during that year was 2,415½; about one-third of the sanctioned new mileage was built.

The total capital expenditure on all the Indian railroads was, at the end of last year, 254.82 crores of rupees (crore = ten million). We shall make no attempt to convert this in o dollars, for it would be very difficult to get the average value of the rupee, which has been as much as 2s. 2d. and as low as 1s. 1d. The standard-gage roads have cost about Rs. 159,000 per mile. The gross earnings the last calendar year were Rs. 262,369,000, and the year before Rs. 255,089,000. Of this the freight earnings in 1895 were Rs. 163,694,000. The capital outlay and the gross earnings have increased for years in about the same ratio as the mileage. The net earnings, however, while always increasing, do not increase as fast as the mileage.

Nearly half the total mileage is state lines worked by companies and almost one-third is state lines worked by the state. Then there are 2,587 miles



worked by guaranteed companies. The total loss to the state on the guaranteed roads was last year Rs. 10,258,000; then there were losses of 4½ million on state roads not yet open, and other items bringing the total apparent charge to the state up to Rs. 17,837,000. But deducting the charges to sinking funds which will eventually redeem the capital, and the interest on lines under construction, the loss to the state in 1895-96 falls to Rs. 7,601,000, or less than \$2,000,000 at the present value of the rupee. A considerable part of this loss is due to the fall in value of the rupee, certain interest being payable in sterling, and the companies' share of the surplus profits being calculated under the contracts at 1s. 10d. the rupee. The aggregate loss to the state due to the railroad outlay from 1858 to 1896 is Rs. 52,927,496, which seems a small matter when we consider the tremendous uses, social, political and military, of the Indian railroad system.

The current year must, we should suppose, see a somewhat diminished traffic, increased loss to the state and another great example of the services of the railroads to the natives, all due to the partial failure of the crops in the Northwest. The movement of grain has become the most important single item of freight traffic. In 1895 the total tons of freight were 33,628,000; the tons of grain and seeds were 7,920,000; the tons of wheat were 1,618,000. After all, the wheat traffic is relatively small, although actually important. The total crop in 1895 (estimated) was 6,278,000 bushels, and only 8.59 per cent. of this was exported.

#### The Traffic Field in 1896.

The railroad problem, said Judge Cooley, is the problem of rates. If this is so, the work of the traffic managers, who make, or maintain, or break the rates for carrying freight and passengers is of the highest importance, and an appropriate subject for an annual review. Reviews of earnings are important, of vital interest, in fact; but earnings are largely controlled by circumstances which neither the traffic manager nor any other officer can change, either one way or the other. A survey of the traffic field for 1896, as viewed from the standpoint of the Interstate Commerce Commission, has already been given, in the report of that body to Congress, printed in these columns, Dec. 25, and our comments upon it last week. Let us look at some facts from the other side and at a few incidents not touched upon by the Commission.

The Joint Traffic Association and its doings constitute the most important traffic news of the past year, and it comes first chronologically. Mr. Morrison's blind attack upon it having been sprung in January. The success of the Managers in bringing order out of chaos in the enormous freight business between the Mississippi River and the Atlantic seaboard is too fresh in the mind of every reader to need more than a mere mention here; but it may not be out of place to remind some of the critics that order has not been secured by a sacrifice of reasonable flexibility. The reduction of the grain rate from 20 cents to 15, and its orderly restoration to 20, when restoration seemed wise, is tangible evidence that even such unwieldy bodies as nine great railroad corporations can act rationally, in spite of the perplexing obstacles found in legislation and modern business conditions.

The precise effect on earnings of the stability of rates secured by this new association cannot be estimated, for the general freight business of the country has been extremely dull throughout the year; and the very free movement of corn, which has kept cars and engines busy some of the time, has served to only partly fill the void which otherwise would have existed. With such lack of work for men and appliances the strife for business has, of course, been severe, and all interested agree that if this strife had not been regulated the earnings of all the roads would have been very much less; and to the benefit of no one but a few speculators.

Mr. Morrison claims, we believe, that the general adherence to established rates during the past year has been due to the effect of the Brown decision, which warned rate cutters that they might be compelled to disclose their tricks. It is quite possible that that decision has had some effect, for there has been improvement at some places outside the territory of the Joint Traffic Association. At all events, we are glad to have all illegal rate cutters scared as much as possible, and in any legitimate way, and it is proper that Mr. Morrison should take all the satisfaction out of the matter that he can get; but it is not unreasonable to suppose that when the Board of Directors of a railroad decide that if they want rates cut they will do the job themselves, and they advise their subordinates to that effect, the latter will govern themselves accordingly. This would be the simplest kind of a

business proceeding. And there is no evidence that this is not the true explanation. Moreover, the Trunk Lines had made a radical reform before the Brown decision came out.

The association deals not alone with freight, but also with passenger rates, and the general stability of these has been in marked contrast to the demoralization attendant upon the great convention excursions in 1895.

Two prominent incidents in the history of the Joint Traffic Association have been the demand of the New York grain merchants for a readjustment of the differentials in the rates on grain from the West to the Atlantic seaboard ports, and the little difficulty with the Toledo, St. Louis & Kansas City. The resolution to suspend through ticketing arrangements with that road has been revoked, and it is said that the application of the "Clover Leaf" for an injunction against three Association roads will be withdrawn. If the matter ends in this way the public will probably be left in ignorance of the true merits of the question, and the interesting point of law that was involved will remain unsettled.

The large movement of grain from Nebraska, Kansas and Iowa to New Orleans and Galveston has been an important event in itself as well as a movement seriously affecting the roads in the Joint Traffic Association. The strain produced in the Association by the effort to maintain rates must have been much more severe than it would have been except for this Gulf movement. This movement has been brought about by the deepening of the entrance to Galveston Harbor, by the construction of additional elevators at that port and New Orleans, and by the very low rates made by the railroads, especially by the Illinois Central to New Orleans. Ocean rates have also been very low from these Southern ports. No one can yet predict what effect these new facilities will have in years when the corn crop is only of moderate volume; but there has been a general feeling that the improvement in the fortunes of the Gulf ports is, to some extent, permanent, and the supposed fact that corn could not be shipped by way of the Gulf in warm weather seems to have been materially weakened.

The Southwestern Traffic Association has been as successful as the larger organization from which it was copied, though its field—the territory southwest of St. Louis—is far smaller, in a business sense, and the demoralization had not been so bad.

Outside of the territory referred to in the foregoing paragraphs perhaps the most important thing has been the reorganization of the Western Freight Association. Rates in that territory were in fair shape until about July, when the independent action of the weaker roads became so reckless that the stronger roads, those which wished to maintain an association, made general and extensive reductions so as to expose the practically secret rates made by the hot heads. This resulted in complete confusion, which lasted until about November, when the managing officers came together and agreed upon a new and rigid plan of organization. Since then there has been apparently a good degree of stability. There, as in the East, the improvement is essentially due to the determination on the part of individual presidents to abstain from irregular cutting. Whether the executive organization—a board of administration of five members, wholly independent as regards any individual road, instead of a conference board—will be able to perform the functions so successfully handled by the Joint Traffic Managers, remains to be seen.

The Western Passenger Association has made progress, its mileage ticket bureau being an important instrumentality for the maintenance of regular fares.

The agreement of the anthracite coal producers, familiar to our readers, was practically a railroad agreement, as all the large producers are railroad companies, and it has been an important factor in maintaining the rates for transporting this coal. The bituminous coal interest in the Eastern states, also those in Ohio, have formed, and to a certain extent carried out, agreements which have helped to prevent demoralization of rates.

The Erie Canal has carried a large volume of grain this year, thus affecting the railroads between Lake Erie and New York City, but rates have been pretty well maintained—a decided contrast to the conditions of 1895. New York state has passed a law compelling railroads to carry bicycles in baggage cars free. These are two items which do not worry the Interstate Commerce Commission.

There have been three or four railroad wars affecting limited territory. The worst was that in the South, in which the Seaboard Air Line made a violent reduction of rates for the purpose of punishing its powerful competitor, the Southern Railway. This contest was stopped partly by the courts and partly by a change of heart on the part of the Seaboard Air Line directors, and nothing has been settled. The "Car

Ferry," carrying freight cars on floats from Chicago to the north end of Lake Michigan, tried to get away from the railroads some of the traffic to St. Paul. Whether the severe reductions made will result in settled rates next summer remains to be seen. There was a brief war in passenger rates between Denver and Southern Colorado points; and the Southern Pacific, on its line between San Francisco and Portland, has been carrying both passengers and freight at low rates to compete with vessels carrying all of the way by water.

The fast and luxurious trains to California, run by the Southern Pacific from New Orleans, and by the Atchafalaya from Chicago, are worthy of note as innovations in passenger traffic which seem likely to be permanent. The Lake Shore & Michigan Southern has sold half-rate tickets for round trips over nearly the whole of its road on Sundays. The Chicago & Northern Pacific, carrying suburban passengers to and from Chicago, has reduced the fares, on a large volume of business, to the uniform rate of five cents, to compete with electric street railroads; and similar but less important reductions have been made at other cities. In still others the standard railroads have had to give up some local passenger business to the street roads, either because it was deemed unwise to make a reduction, or because the business could not be retained even with a reduction.

In the review which we made a year ago, we were obliged to characterize 1895 as a year of unstable rates. It is gratifying to be able at this time to take a different view, and to indulge the hope that 1897 will be marked by a further spread of the rational traffic methods which have made the history of 1896 a refreshing contrast to that of all previous years.

#### Steel Ties.

The well-worn subject of steel cross-ties is taken up in a general way in *The Engineer* of Dec. 25. The object of the writer of the article was to present broadly the arguments for and against rather than to describe special applications. He begins properly by saying that the most opposite opinions are held on this important subject. "As a rule English railway companies, those in Belgium, France and the more western parts of the Continent, evince a decided preference for the timber sleeper. Toward the eastern parts of Europe a very strong predilection is shown for the newer metallic systems." He might have added that in the United States, where about two-fifths of all the railroad of the world is to be found, there is also a decided preference for the timber sleeper. In fact, steel ties are still practically unknown in the United States. They are to be found to-day in our tracks only in a few short and isolated stretches where they have been put in either for trial or for some special purpose, as, for instance, in the new work on the New York Central entrance to New York City, where it is worth while to spend considerable money to avoid frequent repairs to the tracks.

The writer in *The Engineer* asks us to bear in mind at the outset that the wooden tie has one great advantage. It is universally applicable, while in some soils steel ties would soon go to ruin. Indeed this, we should say, is its greatest advantage, this and the ease with which it can be handled in original laying, in changes and repairs.

It is suggested by this writer that possibly steel ties, at least so far as they have yet been developed, are inapplicable to very fast and intense traffic. At least no high speed records have ever been made on a wholly metal track, and it remains to be demonstrated that the metal attachments would stand the wear and tear of heavy loads, incessant traffic and high speeds. While it is true that the applicability of metal ties to such traffic has not been proved by experiment, it does not seem likely that any unusual difficulty would be found in this direction, and surely so far as intensity of traffic goes a demonstration will shortly be made on the New York Central track, of which we have spoken above. We are informed that in Belgium the engineers of the State Railroads have come to the conclusion that metal sleepers should be used only where the traffic is comparatively light and slow.

It is said that on soft soils the work and cost of tamping steel ties, particularly during the rainy season, is greater than would be the case with wood, and it is added that a wooden tie can stand a derailment without being ruined, while a steel tie has a very good chance of becoming so distorted as to be useless. Another point of apparent superiority is that the wooden tie has its own elasticity, and that this cannot be given to the metal tie without adding parts, and furthermore the wooden tie beds itself much more securely in the ballast. The writer closes by saying that "in the opinion of many competent engineers the steel sleeper has its own particular sphere of application, and from its immunity from the ravages of insects its services will always prove invaluable. It is just possible that we do not much use the steel sleeper because we do not much want it."

So far as the United States is concerned the sentence last quoted is probably correct if we use the word "want" in the sense of need. We have no occasion in our whole territory to provide against the ravages of



white ants, nor are there other especial destructive agencies at work which can be best provided against by the use of metal ties. On the other hand timber is still so cheap, and as far as can be judged, is destined for years to be so cheap, that we may conclude that the metal cross tie will have no important place in this country until we have exhausted the possibilities of tie plates and preserved wood. It might, however, be wise for those of our steel makers who are prepared to invade foreign markets to look abroad with a view to supplying steel ties for those countries which do need them.

A good deal has already been done in reducing the annual fixed charges of certain railroad companies by refunding operations. The railroad reorganizations of recent years have furnished so many instances of enforced reductions of interest, that public attention has been rather diverted from the more regular operation. It must, however, become of increasing importance and interest. A summary of the saving which has been made to the railroads in the decreased interest charges on the lower rate bonds of recent years would be an interesting study. It has, however, not the present interest which information of the bonds falling due in the next few years possesses. It happens that a long list of railroad bonds mature in the closing years of the century, and a summary of these securities, prepared by the New York News Bureau, has peculiar value, as showing how extensive these refunding operations will become in the next few years. The summary shows that from 1897 to 1900, including both years, railroad bonds amounting in principal to \$223,881,000 become due and payable. These bonds now call for interest rates of 5, 6, 7 and even 8 per cent., and the annual interest charges, as calculated by the News Bureau, is altogether \$14,481,000. The importance of the heavy saving in interest charges which the railroads will be enabled to effect is very apparent. Assuming that the bonds can be reissued at 4 per cent., which is a very probable rate, if we are able to maintain the national credit, the saving in yearly interest charges foots up to \$8,917,000, which is about 3.7 per cent. of the total interest charges of the railroads of the United States, as shown by *Tier's Manual*, and 2.7 per cent. of the net earnings in 1895. The statistical report of the Interstate Commerce Commission for 1895 shows that 20.58 per cent. of the total railroad funded debt bears five per cent. interest; 17.4 per cent. bears from 6 to 10 per cent. interest. Some of the larger items in the table are summarized below. It should be noted that maturing bonds of a subsidiary company are included in the total given in this recapitulation, against the parent or operating company:

Railroad.	Amount of issue.	Rate.	Annual interest.	Interest at 4 per cent.
Central Pacific.....	\$37,424,000	5@6	\$2,101,400	\$1,456,960
Chicago, Milwaukee & St. Paul.....	6,950,000	7@8	528,558	278,000
Denver & Rio Grande.....	6,382,500	7	446,775	255,300
Illinois Central.....	3,963,000	4½@7	236,460	158,520
Lake Shore.....	19,000,000	7	1,330,000	760,000
Louisville & Nashville.....	8,970,000	7	627,900	358,800
Missouri Pacific.....	11,450,000	5@7	721,500	458,000
New York Central.....	12,000,000	7	840,000	480,000
Pennsylvania.....	12,867,000	7	900,890	514,680
Southern.....	4,373,000	6@7	298,610	174,920
Union Pacific.....	50,685,000	6@8	3,088,800	2,027,400
Reading 68.....	9,364,000	6	561,840	374,560

A few deductions as to the extent of the saving by individual companies enables a more vivid grasping of the benefit which will finally accrue when low-rate bonds have taken the place of those now outstanding. On the maturing bonds of the Lake Shore the saving in interest charges would be \$570,000, more than one per cent. upon the company's capital stock. On Louisville & Nashville maturing bonds the savings would be \$269,100, or over ½ per cent. on the stock. Missouri Pacific would save \$263,500, or more than ½ per cent. Jersey Central would save \$288,300, or over one per cent. The saving for Denver & Rio Grande would equal \$191,475, or more than ¾ per cent. on the amount of its preferred stock outstanding. Even the comparatively small amount of savings in interest on some of the large lines would by no means be despised, as they would amount to 3-10 of 1 per cent. on the outstanding stock of the Pennsylvania Railroad; 4-10 of 1 per cent. on New York Central, and over 1-10 of 1 per cent. on Illinois Central.

The review of the coal trade for the year 1896 made up by the *Coal Trade Journal* shows a total production of anthracite of 43,319,895 tons, as against 46 millions in 1895 and 41 in 1894. The tonnage for December, 1896, presumably estimated, is given as 3,500,000. The review of the course of business and prices in the anthracite market is substantially the same as that given in the *Railroad Gazette* of Nov. 6. In the soft coal trade the principal fact of the year was the agreement between the six different districts shipping to the Atlantic seaboard. This resulted in considerable stability of prices, so much so that the New England railroads, unable to get reductions, bought some coal in Nova Scotia. The average price for bituminous coal at the Atlantic seaboard is believed to have been from 20 to 40 cents more than during the previous year. The Beech Creek and Clearfield districts have not done so well as in 1895, but the Cumberland shows a great gain. The Chesapeake & Ohio has lost, while the Norfolk & Western has held its own, and a little more. The total production of soft coal in the country is roughly estimated at 190 million tons. About three million tons is exported, mainly to Canada, and about one million tons is imported, chiefly on the Pacific Coast.

The Anthracite Coal Operators' Association, in its circular dated Jan. 1, gives estimated figures of shipments over the principal coal roads for 1896 as follows:

Name.	1896.	P. c.	1895.	P. c.
Phila. & Reading.....	9,000,000	20.79	9,905,059	21.47
Lehigh Valley.....	6,770,000	15.44	7,360,154	15.81
Central of New Jersey.....	5,000,000	11.55	5,388,104	11.51
D. L. & W.....	5,700,000	13.17	6,129,200	13.16
Del. & Hudson.....	4,180,000	9.66	4,317,843	9.34
Penn R. R.....	4,750,000	10.97	5,025,645	10.59
Penn Coal Co.....	1,730,000	3.99	1,748,832	3.75
Erie.....	1,720,000	3.97	1,820,038	3.91
N. Y., Ont. & W.....	1,330,000	3.07	1,424,507	3.16
el. Sus. and Sch.....	1,700,000	3.93	1,905,784	4.11
N. Y., Sus. & W.....	1,390,000	3.21	1,492,244	3.02
Totals.....	43,270,000		46,515,670	

Beginning with this issue the statement of eastbound shipments in our Chicago letter will be based on the official figures furnished by the Chicago Committee of the Central Freight Association, instead of on the Board of Trade statement, as heretofore. This change is made for the reason that the Chicago Committee figures are believed to be more full and accurate, for the ground covered, than those compiled by the secretary of the Board of Trade. The Board of Trade table covers shipments from Chicago, both to points east of the Western Trunk Line termini, and to territory west of those termini, and does not include outside Chicago junction points, which should be included. The statement which will hereafter be published includes all freight (except live stock) shipped to Western termini of the Trunk Line Association and east thereof, being the through business, including that from all Chicago junction points, taken account of by the Association.

#### The Boston Subway.

The Transit Commission has made its annual report to the Boston Common Council. A brief review of the financial and legal matters dealt with during the past year is given, followed by the report of the Chief Engineer, which takes up half of the 84 pages. There are over 50 excellent illustrations of completed and uncompleted work. About 29 per cent. of the subway has been finished and about 37 per cent. more is under contract.

The plans for the remaining portion, lying north of Scollay Square, have not yet been fully decided on. The Common has been regraded, and it is expected that all work on it will be finished in the early spring of this year.

The Chief Engineer reviews various subways and tunnels in London, Paris, Glasgow, Buda-Pesth and Baltimore, and the methods employed in their construction, and explains the methods which have been adopted in Boston. A diagram is given showing the relative sizes of other subways and tunnels. The largest of these is the Blackwall tunnel under the Thames, London, with an inside area of 352 sq. ft.; next in size is the St. Clair River tunnel at Port Huron, 290 sq. ft. The smallest section of the Boston subway is 332 sq. ft. in area, while the four-track portion has an area of 707 sq. ft. Following these are detailed accounts of the progress of the work so far as undertaken on the different sections. Although the Boston subway is in many respects novel, no serious unexpected difficulties have been encountered, and so far there are no indications that the cost of the subway will exceed the Engineer's estimate made early in 1895.

The total expenditure on the subway so far has been \$1,630,480, to meet which \$750,000 3½ per cent. bonds were used in addition to the \$1,000,000 4 per cent. bonds of the previous year. The total premium received was \$149,962, making an average net interest on the selling price of 3.48 per cent.

The Charlestown bridge, 1,970 ft. long, of which 1,090 ft. will be over water, was begun last summer and the substructure will be completed next autumn. The Commissioners say that their gross appropriation, \$7,000,000, is not large enough to warrant them in considering a tunnel under the harbor to East Boston.

In digging for Section 3 of the subway near Park street, 12 gravestones were found, and one human skeleton. The oldest headstone dug up was dated July 29, 1677.

The lease of the Boston subway to the West End Street Railroad Company for 20 years has been approved by the Massachusetts State Railroad Commissioners.

#### TECHNICAL.

##### Manufacturing and Business.

The Lebanon Manufacturing Co. is to equip 300 coal cars for the Cornwall & Lebanon with Westinghouse air-brakes and M. C. B. couplers.

The Hancock Inspirator Co., of Boston, announces that, beginning Jan. 1, it will conduct the sale of its goods directly, instead of through agents as formerly.

Mr. Frank E. Barnard has been made a partner in the firm of B. M. Jones & Co., of Boston and New York, who are the agents for Mushet's steel and of other iron and steel companies.

The Safety hollow staybolt iron made by the Falls Hollow Staybolt Co. is to be used in the side sheets of the seven consolidation engines recently ordered by the Norfolk & Western from the Baldwin Works.

Thomas Carlin's Sons, of Allegheny, Pa., have on hand for sale twelve 3-ft. gage locomotives with cylinders varying from 6 in. x 12 in. to 14 in. x 18 in., and two standard gage engines. About 100 3-ft. gage side dump

cars of three yards capacity owned by the firm are now in use on the Butler & Pittsburgh road, as are also two 1½ yard Class A Marien steam shovels and one Bucyrus steam shovel of the same capacity. Two 4-spool hoisting engines, one Allen and one Morrison pneumatic riveter, about 30,000 ft. of manilla rope with chain, etc., and other bridge erectors' material is also on hand. Recently the contractors' plant of C. A. Balph, a building contractor of Pittsburgh, has been purchased.

The Sargent Co., of Chicago, has shipped to the Pioneer Electric Power Co., of Ogden, Utah, a set of castings consisting of one flange casting, 6 ft. 1½ in. internal diameter, two flange castings 4 ft. 7½ in. internal diameter, one breeches pipe 6 ft. internal diameter. The total weight of breeches pipe is 10,000 lbs., and of the flanges and breeches pipe, 13,000 lbs. A stream of water flowing through a riveted steel pipe 6 ft. in diameter, about one mile long, with a fall of 300 ft., is diverted by the breeches pipe into two streams, each 4 ft. in diameter, leading to the power house. The casting is designed to stand a pressure of 200 lbs. per square inch, and in reality will safely carry many times this load.

The Dickson Manufacturing Co., Scranton, Pa., has orders that will keep part of its works in operation night and day for 15 months. The company is building a double pumping engine for the city water-works of New Bedford, Mass.; this will require it to operate certain departments night and day for one year. It is also building large sluice gates for a drainage canal in the City of Mexico. It has orders for six locomotives and has considerable work for the Calumet & Hecla Mining Co.

Two thousand employees of the Westinghouse Air-Brake Company started to work in the Wilmerding shops on Jan. 4, after an idleness of almost a month. Large orders have been received, and the despatches state that the works will probably run steadily from now on.

Land has been purchased near Elizabeth, N. J., along Staten Island Sound and the Arthur Kill waterfront by the John Stephenson Co., which now has shops in New York City. The company is one of the oldest street car building firms in this country. The capacity of the new shops will be three times that of the plant in New York City, which occupies valuable land.

#### Iron and Steel.

The Cambria open-hearth mill resumed operations on Jan. 4. Besides other work, the company has received orders for making 10,000 tons of finished rails for the Pennsylvania, which will keep several mills busy during the next month or more.

The blooming mill of the Bethlehem Iron Co. resumed operations on Jan. 2, after an idleness of nearly two months. The steel mill and other departments, employing more than 1,000 men, resumed on Jan. 4. The company's ordnance works will continue running day and night.

The American Steel Co., operating the old Premier plant at Indianapolis, has shut down to make changes, to manufacture rails. The mill has recently been running on billets for the American Wire Nail Co., at Anderson, and the American Tin Plate Co., at Elwood.

The Carnegie Steel Co. posted notices at its several plants, on Dec. 24, to the effect that its present rate of wages would be continued during 1897.

The plate and sheet mill of the Cleveland Rolling Mill Co., which has been closed down since 1893, will resume operations within a few days, giving employment to about 200 men.

#### New Stations and Shops.

The Texas Midland and the St. Louis Southwestern are to build a union station at Commerce, Tex., to cost \$25,000.

The final questions in regard to the plans for the erection of the proposed Union station at Fort Worth, Tex., are understood to have been settled at a meeting of the officers at Fort Worth, last week. The site of the new station will be close to that of the old structure. The station will be used by the Texas & Pacific, the Gulf, Colorado & Santa Fe, the St. Louis Southwestern, and the Missouri, Kansas & Texas.

The citizens of Paterson, N. J., have been for some time agitating for the construction of a new station of the Erie road in that city, and last week a delegation, including the Mayor and Aldermen, called upon Vice-President Merrill to urge the erection of the new station. Mr. Merrill is reported to have agreed to recommend the erection of a handsome building to his directors.

The Cincinnati, Hammond & Dayton has requested a donation from the city of Lima, O., of \$25,000 and certain lands to rebuild the shops recently destroyed by fire. The land is held at \$20,000, although appraised at \$7,000. Further consideration of the plan is off.

#### Interlocking.

The National Switch & Signal Company, Easton, Pa., has just closed a contract for an interlocking plant to be installed at Mode, Ill., at the crossing of the Toledo, St. Louis & Kansas City with the new line which connects the Chicago & Eastern Illinois with the Chicago, Paducah & Memphis.

#### Uniformity in Freight Cars.

The proposition of the Ohio Falls Car Manufacturing Co. to get concerted action among the railroad clubs toward uniformity in freight cars does not seem to have met with a very enthusiastic reception in the clubs.



At the November meeting of the Southern and Southwestern Club, Mr. Sanderson said that he had been at work, as a member of the M. C. B. Committee on steel frames, collecting information as to the most suitable dimensions, etc. He has now assembled information from railroads aggregating about 500,000 cars. He thinks that any action as suggested by the Ohio Falls Company would be premature, and that it would be better to hold the matter back until the reports of next summer come in. Mr. Spalding said it is not possible in view of the enormous expenses which will be necessary in order to comply with the interstate law that many new cars can be built in the first few years; that is, many in proportion to the numbers built in the past. He said: "I am inclined to believe that we are not going to be troubled much with new construction." The Secretary was instructed to reply to the company to the effect that the club deemed it inexpedient to take any action at present. The letter was presented at the November meeting of the Western Railway Club, but no action was taken. At the November meeting of the Central Railway Club a resolution was passed to lay the matter on the table, and instructing the Secretary to so inform the Ohio Falls Company, and to suggest that that company is anticipating the functions of the Master Car Builders' Association. At the November meeting of the Northwest Railway Club the matter was referred to a committee with direction to report at the January meeting.

#### Arbitration Committee Rulings.

At a meeting of the Arbitration Committee, Master Car Builders' Association, held Dec. 16, the following subjects were considered worthy of a ruling:

H. When scrap credits are allowable the weights credited should always be equal to the weights of the new metal applied, except as otherwise provided in the rules and in Section D of leaflet No. 1, Sept. 16, 1896.

I. Several inquiries as to the meaning of the words "switching roads," in Section 25 of Rule 5, were considered, and the committee makes the following ruling as a definition of a switching road as used in this connection:

A switching road is a corporation doing the major part of its business on a switching charge, or one which does not pay mileage to car owners for the use of the owner's car.

#### Effects of Different Elements in Steel.

In a recent lecture at Sheffield, England, Professor Arnold dealt with the mechanical properties of steel castings. He stated that in order to determine the influence of other elements, particularly of manganese and silicon, it is necessary to know the properties of nearly pure iron and carbon steels. A mild steel, with .21 per cent. of carbon, under test stood a maximum tensile stress of 24 tons per square inch. When 1 per cent. of manganese and .25 per cent. of silicon were added, its stress went up to 33 tons. The stress of a .2 per cent. hardened steel was 34 tons; but a .21 per cent. hardened steel, with high manganese and silicon, developed a stress of nearly 100 tons. The critical point for steel castings is .45 per cent. of carbon, and any increase over this amount rapidly lowers its ductility. With regard to the flow of gas through the walls of a crucible, Professor Arnold stated that under favorable conditions several hundred gallons of gas may pass into the steel during the short time occupied in melting a pound of steel.

#### American Cruisers for the Japanese Navy.

On December 31 the Japanese government signed contracts at Washington for two cruisers, to be built in this country for the Japanese navy. One of the new boats will be built by the Cramp's Shipyard, Philadelphia, and the other by the Union Iron Works, San Francisco. The cruisers will be practically alike and will be somewhat similar to the United States cruiser Columbia. They will cost about \$1,500,000 each. Their length over all will be 374 ft.; breadth, 48 ft.; extreme depth, 30 ft., and displacement, 4,760 tons. They will make 22½ knots under forced draft. The main battery will consist of two 8-in. guns, one in the fore-castle and the other in the poop, with a secondary battery of ten 12-cm. guns; twelve 12-pounders, and six 2½-pounders. The engines will be triple-expansion, with cylindrical boilers.

#### The East River Tunnel.

The locations of the terminals of the proposed tunnel under the East River, between New York and Brooklyn, have been decided upon, so far as the knowledge of the river bed will permit. The New York terminal will be, as originally proposed, in a building to be erected for the purpose at the corner of Ann street and Park Row. The Brooklyn terminal will be on Furman street, probably nearly opposite the foot of Fulton street, but accurate borings in the river bottom have not yet been made, and it may be found necessary to curve that end of the tunnel to the south toward Atlantic avenue, to keep the grade down to its proposed maximum limit of 4½ per cent. In any case, the Brooklyn terminal will be on the west side of Furman street, which runs parallel with the river; this is necessary from the fact that the company has been unable to get a franchise from the Brooklyn Board of Aldermen, and that which it holds from the New York Board only gives rights as far as the Brooklyn water-front, and permits no streets in that city to be crossed. The tunnel will be entirely in rock, the maximum grade at the New York end being four per cent., and at the Brooklyn end 4½ per cent. The contract has been given to the Columbia Construction Co., of which Mr. Frederick B. Esler is President. Two separate tunnels will be driven, each 17 ft. x 22 ft., giving room for two tracks in each; all cars will be run one way through one tunnel and back through the other. Borings will be begun within a few days to determine accurately the conditions of the river bottom with regard

to bed rock. It is proposed when excavation is begun to employ four parties of men, one at each terminal, and two at the New York bulkhead line, which will be crossed just above Fulton street; these last parties will work in both directions from this point. Nothing has yet been done toward acquiring property for the terminals, but the company, which is called the New York & Brooklyn Railroad Co., has the right to condemn property. The present plan is to use the tunnel for cars only and it is expected that arrangements will be made with the different electric surface roads of Brooklyn which have their terminals at Furman street to run through to the New York end, without transferring the passengers and without extra fare.

#### British Ship-Building in 1896.

Statistics of ship-building in Great Britain during 1896 show that during that year the total tonnage launched was 1,326,822 tons, against 1,156,571 tons in 1895. Of that total the National dock-yards turned out 71,970 tons, which is 1,621 tons more than in 1895, and is the largest output on record of the National workshops. Messrs. Harlan & Woolf, of Belfast, turned out 81,316 tons; Sir W. G. Armstrong & Co., of Newcastle, turned out 20 vessels, with a total of 51,147 tons, with 67,770 I. H. P., these vessels ranging from 1,900 to 12,700 tons; Sir William Gray & Co., of Hartlepool, turned out 43,545 tons, with 23,650 I. H. P., the vessels ranging from 1,738 to 5,600 tons; Messrs. Connell & Co., of Scotstoun, turned out 40,864 tons; Messrs. C. S. Swan & Hunter turned out 11 vessels, aggregating 39,608 tons and 17,625 I. H. P.; Sir Raylton Dixon & Co. turned out 20 vessels of 36,111 tons and 16,000 I. H. P., of which 14 were steam and the remainder sailing vessels; Messrs. Furness, Withy & Co., Limited, turned out 10 vessels, aggregating 31,603 tons and 12,080 I. H. P. In the Mersey District, Messrs. Lairds' shipyard turned out 14 vessels, the most notable being Her Majesty's ship Mars, a twin-screw battleship of 8,000 tons gross register and 12,000 I. H. P.; from this yard were also launched a number of torpedo boat destroyers for the home government, as well as several vessels of the same class for the Chilean navy.

#### THE SCRAP HEAP.

##### Notes.

The Norwegian government offers four prizes for the best plans for railroad stations. The value of the prizes ranges from \$275 to \$2,775.

The car house and power house of the Raleigh Electric Street Railroad at Raleigh, N. C., was burned on the night of Dec. 31. Loss, \$50,000.

The Illinois Central now dates the tickets at its principal offices with a perforator, the day of the year being punched through the face of the ticket. This is the plan that has been in use for several years on the Chicago & Northwestern.

The working time of the men in the shops of the Pennsylvania Railroad, at Altoona, has been increased 10 hours a week. In some of the shops of the Baltimore & Ohio large reductions of forces or of working time have been made.

It is reported in the daily papers that on Tuesday of this week a number of officers of Western roads called upon the Interstate Commerce Commission to ask that the time allowed by law for equipping freight cars with automatic couplers or brakes, which is now less than one year, be extended.

The Manhattan Delivery Company is the name of an organization just formed to run express wagons in New York City. It seems to be affiliated with the Adams Express Co., and the President is James Egleston. Wagons are run at regular hours, and central offices have been established in 16 different districts of the city. It is proposed to provide shippers with blanks which shall take the place of the tag, the shipping receipt and the way bill, and also be used as a means of paying charges.

A coal pile of the New York, New Haven & Hartford at New Haven, was found on fire the other day from spontaneous combustion, and a large gang of men had to be set at work moving away some of the coal in order to get at the fire and put it out. We note this fact merely to make a slight correction in the estimate of the magnitude of the fire made by the enterprising reporter; he said, on Dec. 30, that between 10,000 and 20,000 tons had already been consumed. But an officer of the road has this week informed us that the total loss, including cost of labor, was only \$500.

The law of Florida requiring local agents of express companies doing business in that State to pay a license has been affirmed by the Supreme Court of the United States. It is held that the purpose of the law was to impose a tax upon the right to do business in the State only, and that if the companies did not choose to carry on local business the Courts could not compel them to do so, but the tax would have to be paid nevertheless. The Supreme Court of the United States has also affirmed the constitutionality of the law of Missouri which gives property owners a right to recover damages of railroad corporations for the destruction of property caused by fire communicated from locomotives.

The town of Crown Point, Ind., which ordered the Pittsburgh, Cincinnati, Chicago & St. Louis Railway to keep flagmen at two street crossings, and tried to recover \$1,500 penalty for 150 days' neglect to comply with the order, has been "turned down;" that is to say,

the Supreme Court of the state has decided that the town has no authority to make such a requirement. The decision holds that if the trustees of the town deem gates or flagmen necessary they may maintain them at the expense of the town. Under the law, the Court says, a town may, for the protection of its citizens, limit the speed of trains passing through its limits, and maintain gates and flagmen at the street crossings, but it cannot require a railroad company to maintain such safeguards. The railroad is liable in damages, the court continues, to any one who, without fault on his part, is injured by the negligence of the railroad at such street crossings; but there the responsibility of the railroad company ends.

#### The Railroads and the West.

Mr. Thomas P. Fowler, President of the New York, Ontario & Western, who occasionally surrenders to the newspaper interviewer, has recently returned from a long trip of inspection over the lines of the Atchison Topeka & Santa Fe road, in company with the other directors, and sums up his impressions of that property, and of Western conditions, in part as below:

"Much of the main line of the Atchison is fully up to the highest Eastern standard. The ties throughout are in good life and much of the track is ballasted with broken stone or good gravel. Many miles of heavy rails were laid during the receivership, and also since the reorganization, and this work will be resumed in the spring and continued until all of the main line and branches are up to the standard adopted. Many thousand feet of wooden trestles have been filled, or replaced with permanent steel structures during the past year. These improvements are being charged to operating expenses, as well as additions to motive power and equipment. The company is served by efficient officials, and there is no doubt in my mind as to its ability hereafter to earn its fixed charges. For a time, at least, the company's surplus should be used to bringing the road-bed and equipment fully up to a point which will ultimately reduce the operating cost and enable the company to economize when necessary, without running the risks of deterioration.

"I believe they are beginning to realize out in the West that they cannot injure the railroads without doing as much or more harm to themselves. Much of the railroad mileage of the Southwest has been in liquidation, in many cases owing to bad management, it is true, but adverse legislation has also been a factor. There is good ground for hope that adverse legislation has gone as far as it will go, and that the pendulum will now swing in the other direction. I would not be surprised if the Populist would now set a good example to his legislative brother of other political faiths. One of my Populistic friends in Kansas with whom I was discussing the outlook slyly reminded me that no Populistic measure had been so unfair to the railroads as two of the bills passed by our own New York Legislature last winter—one obliging the railroads to carry bicycles free of charge, and the other, compelling all companies to issue mileage tickets at 2 cents per mile, when some roads in our state find it unprofitable, during nine months out of twelve, to run as many trains as the public demands at 3 cents a mile for local fares."

#### An Amphibious Railroad.

An amphibious railroad is now included among the attractions which Brighton offers to the satiated Londoner, who is ever in search of a new pleasure. It is called the Brighton & Rottingdean Seashore Electric Railway, and it was formally opened on Nov. 28. The line extends along the coast between Kemp Town and Rottingdean, about three miles, but it is laid on the foreshore at several hundred yards' distance from the face of the cliffs. The car consists of a platform and saloon and is capable of accommodating about 150 passengers. It is supported at about 24 ft. above the ground level on four tubular legs well braced together. The foot of each leg is formed by a box or cover, containing within it four wheels. Down two of the legs pass two shafts, each driven by a 30-H. P. electric motor, and coupled to the wheels by means of spur and bevel gearing. Down the other two legs pass rods to actuate powerful brakes acting on the wheels. The current, generated at the Rottingdean terminus is carried by an overhead wire, supported by telegraph poles, and is transmitted to the car by the ordinary tramway "trolley" contacts. The saloon, which is furnished with excellent taste, is capable of seating about 50 passengers. On the upper deck there are garden chair seats, so arranged as to leave ample space for promenading and the enjoyment of the billows and the breeze. The line is composed of two parallel tracks, the gage of each track being 2 ft. 8½ in., and the distance between the two outer rails 18 ft., so that the car is supported on a very broad base and is proof against being overturned by either wind or sea. The rails are laid on blocks of concrete bedded and morticed into the sea floor, about 3 ft. apart. It has taken about two years to complete the three miles, as on account of its position it was only possible to work at it during a few hours a day, the sea covering it at other times. The expense of the line, including the two new piers has been some £30,000. The speed of this marine car, it may be well to say, is restricted by the Board of Trade to eight miles an hour, and the three miles were covered on its trial trip in about half an hour.

#### Grade Crossings in Boston.

The Mayor of Boston, in his annual address to the City Council, devotes considerable space to railroad improvements, speaking of the new union terminal station and the proposed enlargement of the freight terminals in South Boston, on the east bank of the Fort Point Channel, opposite the site of the new station. This proposition involves abolishing the grade crossings on Congress street and substituting a new street, passing over the tracks on a long bridge. This plan has been agreed on by the representatives of the state, the city and the railroads. The Mayor urges, as the most satisfactory solution of the problem in East Boston, the conversion of the Boston, Revere Beach & Lynn into an electric line, and its relocation, within the limits of East Boston, upon some street west of the present line, so that the latter could be used for the tracks of the other railroad companies.

#### Christmas Dinner on the "Katy."

Fresh strawberries constituted the most prominent item in the Christmas dinner served at the dining stations of the Missouri, Kansas & Texas Railway, as appears from a handsomely decorated bill of fare which we have received from Mr. Miller, Superintendent of the Dining Service Department of the road. In addition to the strawberries, and the more common items of a Christmas dinner, this bill shows blue-ribbon celery, larded quail and angel cake, with a variety of other dishes, making 40 items in all; and all of this is given for 50 cents. Whether the passengers of this line are as



generously treated on other days than Christmas does not appear. If they are, we must conclude that the M., K. & T. is trying to make the balance of its refreshment-room account come out on the same side that dining-car balances generally do.

#### The Paris Exposition of 1900.

The people of Paris are proceeding steadily with the preparations for a great and splendid World's Fair in the year 1900, and knowing their skill and thoroughness in such matters we may believe that the project will be carried out in an orderly and attractive way, and that at the time of opening everything will be ready. But it has been pointed out that a great deal is to be done in the way of providing transportation within the city of Paris. M. Leo Dax, writing in a recent issue of the *Technical Review*, suggests that the astonishment of foreigners, and even of the people of several provincial cities, will be great when they discover that Paris has no Metropolitan railroad and almost no electric tramways. The internal passenger traffic is still carried on by omnibuses drawn by horses. A considerable extension of electric tramways is promised for 1900 and horseless-carriages at low cab prices are also under trial. Moreover, prolongations of some of the great railroads ending at Paris are either in execution or under study. The enlargement of the Lyons station in Paris is being actively pushed. The prolongation of the Moulineux line, and the construction of the station of Les Invalides, and the prolongation of the Sceaux line and the building of the Luxembourg station are already accomplished. The Orleans Company will extend its line into the heart of Paris and establish a terminal where now are the ruins of the old Cour des Comptes. Moreover the Legislature has approved the provisional agreement made five years ago between the Minister of Public Works and the Western Company for a considerable extension by that company. The line from Courcelles to the Champ de Mars has been declared of public utility. This will be partly in tunnel and will run along the Seine by the Champ de Mars to the Invalides station. Two new suburban lines will probably divert from the great city stations of the Western Company, already much crowded, a considerable part of the traffic which will be directed to the new Invalides station. All these works must, according to the agreements, be finished by the middle of January, 1900.

#### The Brussels International Exposition.

An international exposition is to be held in Brussels, Belgium, beginning April 24, 1897, and lasting until Oct. 31 of the same year. It will include works of art, scientific works and the industrial and agricultural products of all nations. A special section will be devoted to congresses and lectures, and we judge that it is the present intention to devote considerable attention to electric railroad subjects. The halls of the exposition buildings will cover more than 100,000 square meters. The American Commissioners are J. H. Gore, Columbia University, and Thomas Wilson, United States National Museum, Washington, D. C.

#### Concerning "Deceleration."

At a public dinner, Mr. G. H. Turner, General Manager of the Midland Railway (England), said that the Midland had recently suffered some abuse at the hands of certain sentimental friends because it did not imitate the action of its neighbors, the East Coast on the right and the West Coast on the left, who, with practically no difficulties in the shape of gradients and with little or nothing to drop off or pick up upon the line of route, went galloping headlong through the country to achieve the satisfaction of seeing in how short a time a given distance could be accomplished. Now, he was prepared to claim for the Midland Company a position second to none in ability to run as fast as any line in the world when it was necessary and expedient to do so. They possessed the finest locomotive power in the world, and the condition of their permanent way was second to none. They carried a greater weight of traffic over one pair of rails in a given time than any other existing railway company. But they had, at the same time, a busy commercial population along the line of route whose necessities and requirements they could not afford to ignore, and they would be untrue to the great traditions they had inherited did they not endeavor to treat the large manufacturing centers which they served as liberally as their customers in London. They had lately been treated to a new term in railway literature—the word "deceleration," which, it was stated, had been coined since the days of Sir James Allport and his esteemed predecessor, Mr. John Noble. It was true that they did not put down on paper that their trains were booked at a speed of 75 miles an hour, but he might say that those present at the trial trip from which they had just returned had been carried at that speed when probably they did not think they were going at a higher rate than 30, because they were conveyed in such ease and comfort that they could not tell the difference. They rather preferred to put on paper what they could actually perform than to book trains at speeds which it was impracticable to accomplish.—*Herald's*.

#### A Car-Ferry Steamer for Russia.

In previous issues we have several times spoken of the plan of the Siberian Railroad to ferry trains across Lake Baikal, thus avoiding, for the present, building the road around the southern end of the lake. A ferryboat for this purpose has been built by Sir W. G. Armstrong & Co., England. The boat has been designed for breaking ice, and the stem and stern are of heavy steel castings, and the hull is strong and heavy. The frames are of deep channel section, closely spaced, and a belt of 1-in. plating, some 9 ft. in width, extends from stem to stern at the water line. The hull is made of Siemens-Martin steel of high tensile strength. The dimensions are 290 ft. by 57 ft., with a draught of 18 ft. 6 in. and displacement of 4,300 tons. The principle of water-tight compartments is carried so far that the vessel must be pierced in several places before she is in any danger of sinking. In addition to the water-tight bulkheads, there is an inner bottom. The driving machinery consists of three sets of triple-expansion engines working at 160 lbs. Two sets drive twin propellers fitted at the stern, and the third a propeller at the bow. The last is for the purpose of disturbing the water to help in breaking the ice. The hull was erected, marked, taken down and packed on an ocean steamer ready for shipment to St. Petersburg. At this point the material will be loaded on cars which will carry it to the end of the Siberian Railroad, 150 miles east of the Yenisei River, about 3,200 miles from St. Petersburg, and in the neighborhood of 600 miles from Lake Baikal. From the end of the road to the lake, the material will be transported on sledges. At the lake, the parts of the vessel will probably be assembled on a floating pontoon dock, for which the builders of the boat have supplied machinery and fittings. Our readers are, of course, aware that a car-ferry on the same principle, using boats with a screw at each end, have been in operation for a number of years, carrying the trains of the Michigan Central across the Straits of Mackinac, from

Mackinaw City to Point St. Ignace. These boats are often compelled to break their way through ice several feet thick.

#### B. & O. Offices in New York.

The Baltimore & Ohio has leased new offices at 434 Broadway, New York City, corner of Howard street, a block north of Canal street, in a central business district. Here may be found Messrs Lyman McCarty and James Mosher, General Eastern Passenger and Freight Agents, respectively, besides the contracting agents and ticket clerks.

#### Spanish-American Notes.

The Central Argentine Railway reports that during the year 1895 it carried over its line 382,843 tons of wheat, flour and bran; 8,512 tons of barley; 58,558 tons of linseed; 302,888 tons of corn; 12,228 tons of hides; 82,207 tons of wool and hair, and 62,958 tons of hay.

The Buenos Ayres & Pacific Railroad, one of the last of the Argentine roads to be substantially benefited by the general improvement of the country, has shown a marked increase in earnings during the year ended June 30 last, the net income having been \$855,074 gold, against \$549,725 in 1894-95. The length of this line is 426 miles.

The present fiscal year promises to be a still more prosperous one for all the important Argentine railroads, owing to the favorable prospects for the wheat harvest, the estimated amount of wheat available for exportation being not less than 1,000,000 tons. The crop in the province of Buenos Ayres will be larger than usual; that in Santa Fe up to the average of past good years. Entre Rios alone reports a short crop.

The Peruvian government has asked for proposals from railroad contractors, or other suitable corporations, for the construction of a railroad from Lima southward to Pisco, with privilege to extend on to Callao, the port of Lima, as well as to build branches up the principal valleys of the Ica. The government offers to admit all materials necessary free of duty for 20 years, to grant exemption from all taxes and from expropriation, and to cede 61,750 acres of land.

#### Lake Notes.

The Detroit Dry Dock Co. will build a 5,000-ton steel ship for sale, which will give its yard fair business for the winter.

The American Steel Barge Co., now building one 400-ft. vessel and lengthening two others, will soon begin a steamer of the 7,000-ton class.

The Excelsior car dumping machines have recently taken up, dumped and replaced on track 20-ton cars of coal in 20 seconds. One machine last season handled 23,157 loaded cars. In 110 minutes 39 cars were taken up and dumped into one ship.

Lake shipbuilders have been asked for figures for two 6,000-ton steel package freight ships for the Northern Steamship Co. (the Great Northern Railway). The company now owns six steel package ships of 2,500 tons capacity, besides the magnificent passenger ships North West and North Land.

F. W. Wheeler Co., Bay City, will build at once a 300-ft. steel ship for L. H. Hall and others of Buffalo. It has been rumored that this shipyard was likely to be sold to English capitalists. It is the largest yard on the lakes with capacity for constructing nine modern vessels at one time. It has boiler and engine shops, Brown conveyors for carrying material to the building slips, and is completely fitted with labor-saving devices.

#### Trans-Michigan Car Ferriage.

The traffic eastward across Lake Michigan for the past few years, chiefly flour from Minneapolis and grain, has been growing rapidly. While a year ago there were but 10 car ferry boats running across Lake Michigan, some of them with inadequate terminal facilities, there are now 18 large vessels, many of them built especially for car ferriage, and all with excellent terminals. The Flint & Pere Marquette route now has in use its new vessel, with a capacity of 30 loaded cars, and five others, all large. This is the Milwaukee, Manitowoc & Ludington line. The Milwaukee, Muskegon & Grand Rapids route has two large boats; the Crosby line, Milwaukee to Muskegon, two steamers; the Grand Trunk, Milwaukee to Grand Haven, two steamers; the Milwaukee, St. Joseph & Benton Harbor line, two steamers; and the line between Kewaunee, Manitowoc and Frankfort, four large steamers.

#### Land Grants to Railroads in Minnesota.

State Auditor Dunn, of Minnesota, in his report to the Legislature, says that the grants of land in Minnesota to railroad companies by Congress and by the state have amounted to 20,000,000 acres. The total area of the state is about 46,000,000 acres. He values these railroad lands at \$103,000,000, or about \$32,200 per mile. The companies have already received over 10,000,000 acres, and under the Swamp act, from the state they have received over 3,000,000 acres additional.

The Auditor recommends that action be begun in the courts looking to the recovery of mineral lands already conveyed to the Duluth & Iron Range Railroad, amounting to 200,000 acres, and that the remaining portion, 403,000 acres, be declared forfeited. These lands are valued at \$3,000,000. He calls attention to the constitutional provision that all state lands must be sold at public auction. As the timber has been considered part of the realty, it has been similarly disposed of, and the State Auditor now raises the question whether the mineral is not also a part of the realty, and should therefore be disposed of in like manner.

#### Limited Tickets on the Louisville & Nashville.

Mr. Atmore, General Passenger Agent of the Louisville & Nashville, has designed a local (book) ticket made on the principle of the money order blanks used by the post office and by the express companies, the number of miles for which the ticket is good being approximately indicated by its size. The ticket is 3 in. x 5 in., and the destination is to be written in, as with ordinary book tickets. The numbers indicating distance take no account of any smaller amount than 10 miles. Each ticket-seller has a cutter by which he can quickly divide the ticket at the proper place, the piece cut off being his stub. Mr. Atmore will put this ticket in use on the Louisville & Nashville. He has also made a change in the form of limited coupon tickets, applying the same principle to the dates. The new form is printed with the years, running up to 1904, on the outside right-hand edge of the ticket. At the end of the years and along the line made by the cutter where the years are torn off are the months. At the bottom of the ticket are printed the days of the month. The ticket, by means of the cutter, can be so torn that it is impossible to extend the ticket.

A somewhat similar improvement has also been made in card tickets. A serial number is printed on the back of the ticket. If the ticket is good for 250 miles, the number on the back is 5, the unit of the serial being 50 miles. It is, therefore, impossible to make the ticket good for a longer distance.

#### Paul Morton's Views of Kansas.

The Atchison, Topeka & Santa Fe earnings are good, and its officials predict a liberal increase. They report a fair movement of grain along their lines to the Gulf ports, and also from the corn belt of Kansas into Eastern Colorado. "Western Kansas," said Paul Morton, Third Vice-President of the Santa Fe, "was formerly a grazing country for the buffalo. An attempt to make a farming country out of it has been a failure, and it is now reverting to a grazing one. In Eastern Colorado, where they irrigate extensively and raise large crops of alfalfa, there is a large cattle business, and feeders are buying corn in Kansas at 15 cents, the Santa Fe getting a good business in hauling the corn to them. By feeding the corn farmers and feeders make more money and we get a heavy live stock traffic from Colorado to Kansas City. Corn is selling to shippers along our line at 12 cents, while in Nebraska it has to be sold by farmers at 8 to 10 cents. Being nearer the Gulf ports, Kansas farmers are able to secure better prices than those in Nebraska or Western Iowa. The stirring up that the Eastern papers have given Kansas is benefiting the state by opening the eyes of the people there to their condition, and showing them what the outside world thinks of them. There are enough people in Kansas who desire to do the right thing. The Populists have control of the government, but this is expected by many to make them more conservative. In the past six years Kansas has paid \$75,000,000 on mortgages, \$50,000,000 of which was on the western part of the state and \$25,000,000 was taken by parties in the state, showing that they have some money and believe in their state."—*New York Evening Post*.

#### Connecticut Trolley Statistics.

The Connecticut Railroad Commission's Annual Report repeats its omission of all reference to the large amount of stock of electric roads not issued for cash. It can, however, be obtained by collating the separate returns made by each company, and it will be found in the following table:

	Stock issued.	Issued for cash.
Bridgeport Traction.....	\$2,000,000	100,000
Bristol & Plainville.....	100,000	88,000
Central N. W. & Electric.....	600,000	101,000
Danbury & Bethel.....	320,000	150,000
Deroy Street.....	150,000	600,000
Fairhaven & Westville.....	600,000	200,000
Hartford Street.....	200,000	300,000
H't'd. Man. & Rockville.....	300,000	247,000
Hartford & West H't'd.....	247,000	80,000
Meriden Electric.....	1,000,000	51,000
Middletown Street.....	75,000	300,000
N. H. & Centreville.....	1,000,000	25,000
N. H. Street.....	25,000	247,500
Nowington Trolley.....	247,500	100,000
New London Street.....	100,000	255,000
Norwalk Street.....	255,000	250,000
Norwalk Trolley.....	250,000	10,000
Norwich Street.....	10,000	10,000
Portland Street.....	10,000	20,000
South Man. Co.....	20,000	92,210
Southington & Plantsville.....	92,210	600,000
Stamford Street.....	600,000	40,000
Waterbury Traction.....	40,000	50,000
Westport & Sauganuck.....	50,000	600,000
West Shore.....	600,000	
Winchester Ave.....		
Total.....	\$9,221,740	\$2,671,240

It thus appears that out of the total issue, in the state, of electric stock only about 29 per cent has been issued for cash, and that out of the 26 operated roads in the state only 13, or one-half, have paid in their full issued capital as cash. In the returns of the electric companies not issuing full stock for cash the issue appears with various explanations, of which issues for "construction," for "contractors," and for purchase of the stock of former horse railroads are the most common entries. While not all of the stock capital issued otherwise than as cash is water, much of it is, but what proportion cannot be ascertained. The bonded debt of all Connecticut electric roads is \$8,690,100. In January of 1893 there were 147 miles of street railroad in the state, of which 81 miles were operated by horse power. There are now approximately 345 miles, all trolley roads.—*Evening Post* (New York).

#### Some English Dining Cars.

The new Midland dining carriages which made their trial trip on Monday, and which from New Year's Day will form part of the express service of the company to Manchester, were built in the company's workshops in Derby, and they are entirely the product of English craftsmanship. The splendid run to Derby, which was made without a stoppage, and at the magnificent speed in some parts of over seventy miles an hour, showed the company at its best. The train which made the experimental trip consisted of two new dining carriages. The carriages, which are 60 ft. in length, 8 ft. wide and 8 ft. high, are supported upon underframes of steel latticed girders, and the whole framework rests upon bogie trucks with six pairs of wheels. Numerous India-rubber springs of a new type are interposed between the underframe and the body of the car, the structure being so arranged as to reduce vibration and the irregularities of motion to a minimum. The floors, sides and roofs, have been built up with felt, India-rubber, hair and vulcanite between the timbers for the purpose of deadening the noise, and, to further this object, the side and top windows are double-glazed with plate-glass. The dadoes and woodwork of the saloon are of dark mahogany, richly polished. The solid sides of the seats and the doors are of the same material carved in bas-relief, with artistic devices of flowers and fruit. The general saloon where smoking is permitted is upholstered in a light shade of red. The chairs, which are supported on India-rubber, are seated and backed with Utrecht velvet. Exactly the same class of material has been adopted for the non-smoking portion of the saloon; only in this case the prevailing tint is a pretty shade of green. Underfoot the carpets throughout the saloons are of very heavy velvet pile, resting on a thick layer of elastic felt, while overhead the roof of the car is richly embossed with gold. Each car is lighted by means of compressed oil-gas, and is warmed by hot water from the engine, the heat radiating from a brass grid, which traverses the sides of the carriage. The roofs are of Tynecastle tapestry, made to look like ivory patterned with gold. A ladies' and a gentlemen's lavatory is also provided at either end of the car, constructed on the most approved modern principles. The kitchens and pantries are one end of the car and the baggage rooms at the other.—*Transport*.

#### Interesting if True.

Four months ago there was a rule placed in effect on the Galveston, La Porte & Houston that engineers would be required to pay for all stock killed by them on that line, and since then the amount paid for dead cattle has not exceeded \$20 per month, while before it had amounted to nearly \$1,200 per month.—*Texas Paper*.



## LOCOMOTIVE BUILDING.

The Cape Fear & Yadkin Valley has ordered two locomotives from the Pittsburgh Locomotive Works.

The Southern Pacific has 10 locomotives under contract, five at the Cooke Locomotive Works, and five at the Schenectady Locomotive Works.

We referred last week to the order for locomotives for the Nippon Railroad in Japan to the Baldwin Locomotive Works. The order is for 44 locomotives instead of 40, as then stated, and includes 20 engines for passenger service and 20 more for freight service.

The Baldwin Locomotive Works have completed three locomotives for the Mapimi Railroad, a cog-wheel road to run from Mapimi, on the Mexican Central, into the mountains. These engines are 30-in. gage and weigh about 28 tons; they are so constructed that they may be run either by cog or as ordinary engines. The boilers are set on a six per cent. elevation at the firebox, on account of the steep grade of the road.

The Buffalo, Rochester & Pittsburgh has just put in service, on the heavy grades of its line in Western Pennsylvania, a heavy 12 wheel freight engine, built at the Brooks Locomotive Works, and to be used as a helping engine, general dimensions of which are given below. As yet only one engine of this type has been built.

Fuel.....	Bituminous coal.
Gage.....	4 ft. 8½ in.
Total weight, in working order.....	174,000 lbs.
Driving wheel base.....	15 ft. 6 in.
Total wheel base.....	25 ft. 5 in.
Total wheel base of engine and tender.....	52 ft. 9 in.
Height, top of rail to top of stack.....	14 ft. 5 in.
Height, top of rail to center of boiler.....	8 ft. 9½ in.
Cylinders, diameter and stroke.....	21 in. x 26 in.
Piston rods.....	Steel, 4 in. diameter
Type of boiler.....	Belpaire wagon top
Diameter of boiler at smallest ring.....	68 in.
Crown.....	Supported by direct stays
Staybolts, 1 in. diam., spaced not over 4½ in. from center to center.....	324
Tubes, number.....	2 in.
" diameter.....	12 ft. 7½ in.
" length over tube sheet.....	113 in.
Firebox, length inside.....	37½ in.
Width inside.....	On tubes
Brick arch.....	180 lbs.
Working steam pressure.....	Cast iron, rocking
Kind of grates.....	2,120.6 sq. ft.
Heating surface, tubes.....	185.8 sq. ft.
" firebox.....	2,306.4 sq. ft.
" total.....	29.7 sq. ft.
Grate surface.....	55 in.
Diameter of drivers outside of tires.....	8½ in. x 10 in.
Diameter and length of journals.....	28 in.
Diameter of engine truck wheels.....	5½ in. x 10½ in.
Diameter and length of journals.....	Krupp, steel fired
Engine and tender wheels.....	Level top
Tank, type of.....	4,500 gals.
" water capacity.....	85,000 lbs.
Weight of tender with fuel and water.....	New York
Type of brakes.....	

## BRIDGE BUILDING.

**Bloomsburg, Pa.**—The contract for the stone work on a joint bridge over Roaring Creek, between Northumberland and Columbia counties, has been awarded to Peter Keefer, of Sunbury, at \$3.95 per perch.

**Bradock, Pa.**—It is stated that the Butler & Pittsburgh has abandoned its idea of a bridge across the Monongahela at this place, for which plans have been approved by the Secretary of War and the preliminaries had been arranged for building. A bill has been introduced into the Senate granting authority to the railroad to build a bridge across the river at a point higher up. As soon as the bill is passed it is said that the company will have its plans ready and will immediately submit them for approval. The old plans provided for a railroad and wagon bridge.

**Cumberland, Md.**—The County Commissioners have awarded the contract for building the bridge over Evitts Creek, which went down, to the Toledo Bridge Co., for \$900.

**Millwood, Pa.**—Albert Murray, of Bairdstown, has been given the contract to build an iron bridge over Magle's Run at Hillside.

**New Haven, Conn.**—City Engineer Kelly is preparing detailed plans of the new bridge to be built over the railroad tracks at Chapell street. The bridge will cost about \$45,000, which will be shared between the city and railroad.

The sale of \$250,000 city pavement bonds and \$65,000 bridge bonds has been closed. The whole amount was awarded to Farson, Leach & Co., of New York, at 106.13.

**Pittsburgh, Pa.**—The annual estimate of expenditures of the Department of Public Works for the year 1897, as submitted by Director E. M. Bigelow, calls for appropriations of \$1,698,993, or \$445,068 more than last year. Of this, \$153,013 is asked for the Bureau of Bridges, of which amount \$100,000 is for the rebuilding of the Point bridge and approaches.

**Seranton, Pa.**—The Delaware, Lackawanna & Western objects to the construction of a road from Providence to Chinchilla through its land, unless a bridge be built over its tracks at Clover street. Contractors Streator & Leach have offered to build the road conditionally upon the city contributing \$1,500, the estimated cost of a bridge at that point. City officials will inspect the route and make an early report to Councils.

**Toronto, Ont.**—The City Engineer has reported on the proposed extension of the street car system to the island by means of a bridge extending across the bay from Bathurst street. The estimated cost of the swing bridge is \$61,000, and the entire work about \$300,000. A bridge across the tracks at Front and Bathurst streets will cost \$20,000.

**Victoria, B. C.**—The aldermen have voted to issue \$125,000 in bonds for a new steel bridge with three spans of 217 ft. each.

**Winnipeg, Man.**—The local legislature is calling for tenders for a new bridge to be built over the Assiniboine River near De Clare, in the spring. Plans may be seen at the office of Hon. C. J. Mickle, Birtle, Man.

**Woodstock, Ont.**—At a recent meeting of the Town Council it was decided to issue debentures for building an iron bridge over Manuxnaket.

## MEETINGS AND ANNOUNCEMENTS.

## Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

*Boston & Providence*, quarterly, 2½ per cent., guaranteed, payable Jan. 1.

*Central Pacific*, ½ per cent., payable Jan. 1.  
*Connecticut River*, 5 per cent., payable Jan. 1.  
*Northern of New Jersey*, ½ per cent., payable Jan. 15.  
*Norwich & Worcester*, 4 per cent., on preferred stock, payable Jan. 6.  
*Pittsburgh, Fort Wayne & Chicago*, quarterly, 1½ per cent., on special guaranteed and 1½ per cent. on the regular guaranteed stock, both payable Jan. 5.  
*Pittsfield & North Adams*, 2½ per cent., payable Jan. 1.  
*Portland, Saco & Portsmouth*, 3 per cent., payable Jan. 15.  
*Southwestern (Ga.)*, 2½ per cent., payable Jan. 5.  
*Texas Central*, annual, 3 per cent., on preferred stock, payable Jan. 15.  
*Ware River*, 3½ per cent., payable Jan. 6.

## Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

*Allentown*, annual, Reading Terminal, Philadelphia, Jan. 11.  
*Central of Pennsylvania*, annual, 304 Walnut street, Philadelphia, Jan. 11.  
*Jackson, Lansing & Saginaw*, annual, Detroit, Mich., Jan. 12.  
*Fort Wayne & Jackson*, annual, Jackson, Mich., Jan. 23.  
*Illinois & Iowa*, annual, Chicago, Jan. 20.  
*Lehigh Valley*, annual, Philadelphia, Jan. 19.  
*Philadelphia & Baltimore Central*, annual, Philadelphia, Jan. 11.  
*Philadelphia, Wilmington & Baltimore*, annual, Wilmington, Del., Jan. 13.  
*Pittsburgh & Lake Erie*, annual, Pittsburgh, Pa., Jan. 25.  
*St. Louis, Vandalia & Terre Haute*, annual, Greenville, Ill., Jan. 12.  
*San Francisco & North Pacific*, annual, 222 Sansome street, San Francisco, Cal., Jan. 19.  
*Western New York & Pennsylvania*, annual, 104 South Fifth street, Philadelphia, Pa., Jan. 11.

## Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

*The American Association of General Baggage Agents* will hold a convention at Richmond, Va., on Jan. 20, 1897.  
*The International Association of Car Accountants* will hold a convention at New Orleans, La., on Feb. 23, 1897.  
*The American Railway Association* will hold its convention at Richmond, Va., on April 7, 1897.  
*The National Convention of Railroad Commissioners* will be held at St. Louis, Mo., on May 11, 1897.  
*The International Association of Ticket Agents* will hold a convention at San Antonio, Tex., on March 10, 1897.  
*The Association of American Railway Accounting Officers* will hold a convention at Richmond, Va., on May 26, 1897.  
*The Association of Railway Claim Agents* will hold its convention at St. Louis, Mo., during the last week of May, 1897.  
*The Master Car Builders' Association* will hold its annual convention at Old Point Comfort, Va., beginning June 8, 1897.  
*The American Railway Master Mechanics' Association* will hold its annual convention at Old Point Comfort, Va., beginning June 15, 1897.  
*The National Association of Local Freight Agents' Associations* will hold a convention at Washington, D. C., on June 8, 1897.  
*The Association of Railway Telegraph Superintendents* will hold a convention at Niagara Falls, N. Y., on June 16, 1897.  
*The National Association of Car Service Managers* will hold a convention at Boston, Mass., on June 16, 1897.  
*The Train Despatchers' Association of America* will hold a convention at Detroit, Mich., on June 22, 1897.  
*The Railway Signalling Club* will meet on the second Tuesday of the months of January, March, May, September and November, in Chicago.

## Master Car &amp; Locomotive Painters' Association.

The advisory committee of the association were in session at the Weddell House, Cleveland, Jan. 2, preparing a programme and arranging subjects for the next convention of the association, which will be held at Old Point Comfort, Va., in September.

## St. Louis Railway Club.

At the meeting of Jan. 8 the paper on "The Pooling of Freight Equipment," read at the December meeting by J. R. Cavanagh, Superintendent of Car Service, C. & C. & St. L. Ry., Indianapolis, Ind., will be discussed. In addition there will be a paper by John J. Baulch, General Freight Agent of the Wiggins Ferry Company, St. Louis, entitled "Progress and Advancement of St. Louis Terminals."

## Engineers' Club of Cincinnati.

The ninth annual meeting of the club was held on Dec. 17, with 24 members and several visitors present. The following officers for 1897 were elected: President, Chas. E. Lindsay; Vice-President, G. W. Kittredge; Secretary and Treasurer, J. F. Wilson; Directors, W. B. Ruggles, A. O. Elzner, S. Whinery. The retiring President read a very interesting paper on "Matters Pertaining to Inland Transportation of Interest to Cincinnati."

## U. P. &amp; G. Track Foremen.

The fifth annual meeting of the Association of Track Foremen of the Union Pacific, Denver & Gulf was held at Sterling, Col., Dec. 19. Papers were read by Messrs. Johnson, Christeson, Swan, Papke, Wilson, Hickey, Dodds, Utesler, Eaton, N. Johnson and Conyers. Mr. Conyers' subject was: "Which Makes the Best Track Foreman, a Single or a Married Man?" Superintendent Painter delivered an address and subsequently gave a dinner to the members at the Pacific Hotel. The President of this Association is E. W. McKinney.

## North West Railway Club.

At the November meeting of the North West Railway Club, officers were elected for the ensuing year, as follows: President, George D. Brooke, Master Mechanic, St. Paul & Duluth; First Vice-President, George Dickson, General Foreman, Great Northern; Second Vice-President, John Tonge, Master Mechanic, Minneapolis & St. Louis; Treasurer, J. O. Pattee, Superintendent Motive Power, Great Northern; Secretary, F. A. Foque, Assistant Mechanical Superintendent, Soo Line, Minneapolis, Minn.; Assistant Secretary, W. C. Dallas, St. Paul, Minn.

## American Society of Civil Engineers.

The forty-fourth annual meeting will be called to order Wednesday, Jan. 20, at 10 a. m., in the church at the corner

of Twenty-third street and Lexington avenue, New York. In the evening Mr. Charles Warren Hunt, Secretary, will address the society in the church at the corner of Twenty-third street and Lexington avenue, giving a sketch of the origin, early history and subsequent growth of the society.

On Thursday in the morning, at an hour to be announced at the meeting (probably 9 a. m.), members and guests will leave the Grand Central Station via the New York Central & Hudson River Railroad for Croton Landing, N. Y., which is about 35 miles from the city. At this point conveyances will be in waiting to take the party to the new Croton dam now building at Cornell's, which will be inspected by the invitation of A. Fteley, M. Am. Soc. C. E., Chief Engineer Croton Aqueduct Commission. About an hour will be spent in looking over this interesting work, after which lunch will be served at the Kitchawan House, Croton Landing, and the return to New York made by rail at an early hour in the afternoon.

The following is a brief description of the dam:

Nine dams now built in the Croton watershed are erected on tributaries of the main river, leaving more than one-half of the watershed, which is in all 360 square miles, without any means of collecting the surplus water of the river, with the exception of the Croton Lake, formed by the Old Croton dam, which is far too small to answer the purpose.

The new Croton dam, which is situated at the lowest point of the available watershed, is built for the purpose of retaining all the surplus water which cannot be collected by the upper dams. The reservoir formed by it is to have a capacity of 32,000,000,000 gals., thus raising the capacity of the total storage system to 75,000,000,000 gals.

The estimated average daily capacity of the watershed in a dry year is 280,000,000 gals. per 24 hours.

The available storage behind the New Croton dam is limited to the upper 50 ft. of the reservoir, the great height of the dam being rendered necessary by the fall of the river.

The dam is built on rock, the foundation of which is gneiss on the northern side, and limestone on the southern side, the point of meeting being under the location of the old river bed. The disintegrated rock at and near the surface had to be removed to a considerable depth (as can be seen on the ground) in order to secure a sufficient foundation.

The dam is to be built mostly of masonry with an earth embankment on the south side. The spillway over which the water is to flow is placed and partially built on the northern hillside, where a channel has been excavated in the rock for the purpose.

The necessity of securing a firm foundation for the dam has caused a very large excavation, which, owing to the poor quality of the rock, has extended to a general average of over 80 ft., with occasional depths of 100 to 110 ft. below the original bed of the river.

Thirty-five thousand cubic yards of masonry are now laid in the main excavation.

In order to protect the excavation from the river, a channel has been excavated on the north side, and the river is diverted by temporary dams built above and below the work and connected with the channel wall. The maximum flowing capacity of that channel is estimated to be 18,000 cu. ft. per second, the largest flow on record for the last 50 years. More than one-half of this flow took place in the spring of 1896, without causing any damage to the excavation below.

The width of the dam at the lowest point is 200 ft. The height above the old bed of the river is 160 ft. The height above the lowest point of the foundation is 270 ft.; the length of the masonry part of the dam is to be 700 ft.; the length of the embankment on the south side nearly 400 ft.

In the evening a reception will be held at the Waldorf. At 10 o'clock dancing will begin, and supper will be served in the new ball-room during the evening.

For the excursion on Thursday, through the courtesy of John M. Toucey, F. Am. Soc. C. E., General Manager of the New York Central & Hudson River Railroad Company, transportation on the railroad will be free for members and guests of the society.

## PERSONAL.

—Mr. G. H. Eager, Treasurer of the Crosby Steam Gage & Valve Co., of Boston, died in that city last week.

—Mr. Thomas O. Baker has been appointed Division Freight & Passenger Agent of the Northern Ohio, to succeed Mr. A. S. Miller.

—Mr. William S. Weed has been promoted from General Freight Agent to General Traffic Manager of the Toledo, St. Louis & Kansas City.

—Mr. Edward D. Robbins, who since 1883 has been General Counsel of the New England Railroad Company, has been elected President, to succeed the late William T. Hart.

—Mr. T. C. McNeely, a member of the contracting firm which built the Hendersonville & Brevard Railroad in North Carolina, has been appointed Receiver of the property.

—Mr. W. J. McEdwards has been appointed Division Passenger Agent of the Erie road, to succeed Mr. S. T. Seeley, resigned. Mr. McEdwards assumed his new duties on Jan. 1.

—Mr. Albert M. King, who has filled the position of General Superintendent of the Jackson & Sharp Company's Works for 18 years, died suddenly on New Year's night, of heart disease, aged 48 years.

—The Colorado Midland road will open a passenger and freight office in Chicago this week with Mr. E. G. Davidson, formerly General Agent of the company's office at Kansas City, in charge of the Passenger Department.

—Mr. W. E. Griggs has been appointed Freight Agent of the Erie at Jamestown, to succeed W. G. Bailey. Mr. Griggs was formerly General Manager of the Jamestown & Lake Erie, and later was appointed Receiver of that road.

—Mr. W. D. Trump, Assistant to the General Manager of the Flint & Pere Marquette road, has been appointed General Superintendent to succeed Mr. Potter, who has become General Superintendent of the Long Island road.

—Mr. A. T. Dice, Superintendent of the Atlantic City Railroad Company, has been appointed Assistant General Superintendent of the Philadelphia & Reading road. Mr. George F. Whitcomb has been appointed to succeed Mr. Dice on the Atlantic City line.

—Mr. James T. Clark, who has been General Agent of the Lake Shore & Michigan Southern at Chicago, has been made General Western Freight Agent. Assistant



General Freight Agent M. S. Chase will have charge hereafter of traffic between Chicago and Dunne.

—Mr. James P. Dickson, who resigned the presidency of the Dickson Manufacturing Co., of Scranton, during the past year, has recently been made District Freight Agent of the Delaware & Hudson Canal Co., for its Pennsylvania Division, with headquarters at Scranton.

—Mr. T. F. Steele has been appointed General Freight Agent of the Alabama Great Southern, with office at Birmingham, Ala., vice Mr. H. F. Smith, who has resigned in order that he may devote his entire time to the interests of the Southern, of which he is General Freight Agent.

—Conductor Jeffreys and Engineman Gilman, of Columbia, Pa., have been running on the same passenger train between that town and Philadelphia, on the Pennsylvania Railroad, since Jan. 1, 1872; and they have celebrated the 25th anniversary of the beginning of their work on that train.

—Mr. Frank S. Gannon was presented with a silver service valued at \$1,000 by the employees of the Staten Island Rapid Transit road on Saturday last before he left that road, of which he has been General Manager, to take up his duties as Third Vice-President and General Manager of the Southern road.

—Mr. Edward C. Tomlinson, a Division Superintendent of the Philadelphia & Reading, at Philadelphia, has become, through the resignation of Mr. William H. Geary, Superintendent of the Philadelphia, Newtown & New York and Stony Creek roads, Reading lines at Philadelphia, which have heretofore been operated separately.

—Mr. W. H. Fry, who was Superintendent of the Car Department of the New York, New Haven & Hartford for several years, up to about November, 1895, died in St. Louis a week or two ago. Mr. Fry was perhaps chiefly known through his service with the Pullman Palace Car Co., with which he had been connected before going to the New Haven road.

—Mr. William Barclay Parsons, Chief Engineer of the Rapid Transit Commission of New York City, has been recently elected a trustee of Columbia University in New York City, of which he is an alumnus of the college class of 1879 and of its School of Mines of the class of 1882. Recently he has been President of the Alumni Association of the School of Mines.

—Mr. H. B. Hodges, now Superintendent of Tests of the Southern Railway, has been appointed Purchasing Agent and Superintendent of Tests of the Long Island road and assumed those duties on Jan. 1. Mr. Hodges has been with the Southern Railway as Superintendent of Tests since October, 1895, and previously was with the Baltimore & Ohio in a similar capacity.

—Mr. W. R. Stirling, who resigned the position of First Vice-President of the Illinois Steel Company last spring, in order to take charge of the affairs of the Universal Construction Company, has now resigned the Presidency of that company, intending to associate himself with another line of business. Before doing so, however, Mr. Stirling intends to make a long-expected trip to Europe.

—Mr. H. I. Miller, it is understood, will assume his former position as Superintendent of the Main Line Division of the Vandalia road, the office of General Superintendent, which he has held since his transfer from that office, having been abolished, as already stated. Mr. N. C. Dean, who went from the Pennsylvania service, where he was Trainmaster at Pittsburgh, to become Division Superintendent of the Vandalia, returns to his former position as Trainmaster.

—Mr. James C. McMullin, formerly Vice-President of the Chicago & Alton, and long identified with the management of that property, died in Chicago on Dec. 31. He had been an invalid for the last three years. He was with the Chicago & Alton for over 30 years. After serving as Freight Agent and Superintendent at Chicago he became a Division Superintendent in 1864, and then Assistant General Superintendent until his appointment as General Superintendent in 1868. He held that office for 10 years and then became General Manager, and in 1883 was made Vice-President.

—Mr. William Frederick Potter, General Superintendent of the Flint & Pere Marquette Railroad, has resigned that position to become General Superintendent of the Long Island. The appointment took effect Jan. 1. Mr. Potter is the son of Dr. Henry C. Potter, who resigned as Vice-President of the Flint & Pere Marquette in April, 1891, after almost 30 years of service on the line, the last 11 years as Vice-President. Mr. William F. Potter, like his father, is a thorough railroad man. He was born at Utica, N. Y., Oct. 26, 1855, removing with his parents to Saginaw, Mich., at an early age, and on Oct. 1, 1875, entered the service of the Flint & Pere Marquette as clerk in the office of the Auditor. He was successively clerk in the Treasurer's office, passenger train conductor, Depot Master, Division Superintendent, Assistant Superintendent and General Superintendent, assuming the duties of the last-named office Aug. 10, 1891. Mr. Potter is a man who takes broad views of his calling and who may be depended upon to endeavor to know what is best in practice and to do it. We are prepared to see great improvements in the policy and practice of the Long Island under the new regime.

—The following memorial of the late Mr. Osgood Bradley, car builder, of Worcester, Mass., who died Nov. 7, has been prepared by a committee of the New England Railroad Club: "Mr. Bradley was one of a line of honored ancestry who needed no bond for the fulfillment and conscientious discharge of all life's duties, and this son was in no way wanting. While this association numbers many who knew our deceased friend and his honored father, it is well to put upon our records the recollections of trusty and faithful accomplishments of those who have gone before and who have left a memory to be revered. The firm of Osgood, Bradley & Sons was formed in 1833. The father, Osgood Bradley, Sr., had begun the manufacture, at Worcester, of railroad cars about 1825, and was the first builder of such cars, contemporary with the firm of Davenport & Mason. Their business has been successfully continued since that time, the death of the father and senior of the firm intervening. Our associate and friend had faithfully served his city in her councils and the state in her legislative body, and the attendance at his funeral testified to the general regard for his memory. To some members of this body, among whom are those who have had business and social relations with him, his death comes as a personal loss and with many kindly memories. His charity was broad and his honesty and sincerity of purpose unquestioned."

—President Francis A. Walker, of the Massachusetts

Institute of Technology, and one of the most prominent economists of this country, died suddenly in Boston on Tuesday of this week, aged 56 years. His father was Amasa Walker, also a well-known economist, the author of a book on political economy and a representative in Congress for some years. The son first studied law, but enlisted in the army and rose to be a Brigadier General in the civil war. At the close of the war General Walker took up in succession educational and newspaper work. Later he became Chief of the Bureau of Statistics at Washington and then had charge of the ninth census, in both of which positions his work was important and admirably done. He left the government service to become Professor of Political Economy in the Sheffield Scientific School at New Haven, and in 1881 became President of the Institute of Technology at Boston, serving in the meanwhile on a number of government commissions and organizing the tenth census, although resigning before that was completed to go to Boston. He has been President of the American Statistical Association since 1882 and President of the American Economic Association since 1886. During all these years he had been an industrious writer on the currency and economic matters, and was the author of a considerable number of books on these subjects, his book on bimetalism being the most recent. His text-book on political economy is probably the most widely used of any book on the subject in the colleges of the United States.

—Sir Joseph Hickson, formerly General Manager of the Grand Trunk road, died at his home in Montreal on Monday of this week. He had been in ill health for a long time, but his illness had only assumed a dangerous form within the last three weeks, when paralysis set in. Sir Joseph Hickson has not been in active railroad work since his resignation as General Manager of the Grand Trunk in 1891, but he was long a notable figure not only in Canada but in association with railroad officers in this country, the interests of the Grand Trunk being closely identified with the United States. He was born in Northumberland, England, in 1830, and came to this country about 1861 as Chief Accountant of the Grand Trunk road. He had left a similar office on the Manchester, Sheffield & Northern, and had been identified with English railroad service for some years. Sir Edward Watkin was President of both these companies at the time. From that period he received regular promotion, first as Secretary and Treasurer, and finally, in 1874, he received the appointment of General Manager, on the resignation of the late Mr. C. J. Bridges. He held the position until 1891, when he was succeeded by Mr. L. J. Sergeant. During the time of his management many of the most important changes in the Grand Trunk were effected, notably in the sale of the line from Point Levis to Riviere du Loup to the government, and which now constitutes part of the Intercolonial line. Another change was that of the gage over the entire line to the standard gage of the American railroads. Another was the building of a line from Port Huron, Mich., to Chicago, and the acquiring of the other important lines west of Detroit River. It was under his management, also, that the building of the St. Clair tunnel was inaugurated and practically completed. One of the evidences of the appreciation of the directors and shareholders of the company of services was shown in 1891, when he was called to London, and there presented with gold and silver plate to the value of £2,500. At the date of his retirement, Jan. 1, 1891, he was not only General Manager of the Grand Trunk, but President of the Chicago & Grand Trunk, the Detroit, Grand Haven & Milwaukee, the Toledo, Saginaw & Muskegon, the Michigan Air Line and the Montreal & Champlain road, and was also Vice-President of the Central Vermont and the International Bridge Co. In 1891 the honor of knighthood was conferred upon him by the Queen. All his energies were devoted to his railroad work, and he did not take an active part in Dominion politics, and frequently declined honorary offices in commercial organizations. One important political service, however, he undertook as Chairman of a Royal Commission on the liquor traffic which held hearings all over the Dominion, and made a very exhaustive and valuable report. He held one of the few medals presented by the Governor-General in commemoration of the confederation of the British Provinces, which he received in recognition of his services to the Dominion at that time. Mr. Hickson's manner was marked by simple courtesy and straightforwardness, and in his relations to others was always prompted by a desire to be just. Among his officers, and the employees of the Grand Trunk generally he was held in respect, honor and confidence, and this was true of all with whom he had dealings.

#### ELECTIONS AND APPOINTMENTS.

**Arkansas Northwestern.**—Officers of this company have been elected as follows: Joseph Hansen, President and General Manager; S. F. Stahl, Vice President; James M. Boart, Secretary and Treasurer. These, with the following, constitute the Board of Directors: M. M. Hansen, F. C. Parker, F. Fanning, L. H. McGill, C. M. Robinson, J. A. Rice.

**Atchison, Topeka & Santa Fe.**—A number of changes have been made in the engineering department of the road. Two new positions will be created and the force enlarged. As reorganized, the department will be as follows: James Dun, Chief Engineer; C. D. Purden, Assistant Chief Engineer; W. G. Smyser, Office Engineer; A. F. Robinson, Bridge Engineer; C. A. Morse, Resident Engineer, Fort Madison; M. N. Wells, Resident Engineer, Chanute; W. H. Earl, Resident Engineer, Newton; J. M. Mead, Resident Engineer Pueblo.

**Baltimore & Ohio.**—The new Secretary of the company succeeding Mr. Andrew Anderson, resigned, is Mr. C. W. Woolford, his election by the Board of Directors having taken place on Dec. 16. The name was incorrectly given in our issue of Dec. 25.

General Manager W. M. Green has appointed J. M. Graham Superintendent of the Ohio Division, to succeed J. Van Smith as General Superintendent of the Trans Ohio Division, with headquarters at Newark, O. The division headquarters have been at Chicago. J. H. Glover, Trainmaster of the Ohio Division, will succeed Mr. Graham as Superintendent. The appointments were effective Jan. 1.

**Chicago & Northwestern.**—Edward J. Seymour, Assistant General Freight Agent, in charge of the Ashland Division, will succeed Burton Johnson, resigned, and after Jan. 1 will be located in Chicago as Assistant General Freight Agent of the road. The Milwaukee freight office of the Ashland Division will be closed, and the duties of Samuel Miller, now General Agent of the Peninsula Division, with headquarters at Green Bay, will be extended and increased.

**Chicago, Rock Island & Pacific.**—E. B. Boyd, First Assistant General Freight Agent, has been appointed General Freight Agent of the road, to succeed D. Atwood, who has been transferred to Chicago, to perform special duties under the General Traffic Manager. H. A. Snyder, who has held the position of Commercial Agent at Omaha, will succeed Mr. Boyd.

**Flint & Pere Marquette.**—W. F. Potter having resigned, W. D. Trump has been appointed Acting General Superintendent, with headquarters at Saginaw, Mich.

**Gulf, Colorado & Santa Fe.**—C. F. Resseguie has been appointed General Superintendent for this company, with headquarters at Galveston, vice Mr. P. T. Downs, Acting General Superintendent, resigned.

**Lake Erie & Western.**—Vice-President & General Manager George L. Bradbury has announced the following appointments, effective Jan. 1: Thomas O. Baker, Division Freight & Passenger Agent of the Northern Ohio, with office at Akron, O., to succeed Mr. A. S. Miller, resigned; Frank M. Cole, Traveling Freight Agent, with office at Indianapolis, to succeed Mr. Thomas O. Baker.

**Lake Shore & Michigan Southern.**—The following changes in traffic officials were announced Jan. 1: The office of Assistant General Freight Agent at Cleveland is discontinued because of the resignation of J. G. James. James L. Clark is appointed General Western Freight Agent, with headquarters at Chicago. M. S. Chase, General Freight Agent at Chicago, will have charge of local traffic between Chicago and Dun Park. Mr. Clark will have charge of through traffic at Chicago, with connections, and of contracting and traveling agents in and west of Chicago.

**Pennsylvania.**—The following changes, made necessary by the recent promotion of Assistant Engineer T. P. Abercrombie to Superintendent on the Bedford division are announced: E. J. Cleave, Supervisor of Sub-division No. 6, at Millintown, has been made Assistant Engineer at Williamsport; R. S. Mercer, of Huntingdon, Supervisor of Sub-division, will succeed Mr. Cleave at Millintown; W. L. Cooper, Supervisor of sub-division No. 3, near Lancaster, will succeed Mr. Mercer; H. Nelson, Supervisor of the Altoona Division, will succeed Mr. Cooper. Four other Supervisors have been promoted.

Effingham B. Morris, President of the Girard Life Insurance, Annuity & Trust Co., of Philadelphia, has been elected a director of this company to fill the vacancy, due to the death of Henry D. Welsh.

**Tennessee Northern.**—The incorporators of this new Tennessee company are Evan T. Warner, Grant A. La Follette, Claude J. Webb, James G. Johnson and Leon Journalman.

**Wabash.**—The road has decided to consolidate divisions. Division Superintendent Goodrich will this week remove his headquarters to Decatur.

**Wisconsin & Michigan.**—J. E. Williams, Superintendent, having resigned, the office of Superintendent will be abolished, the office of Superintendent of Transportation created, and S. N. Harrison appointed thereto, with office at Menominee, Mich. A. A. McFall has been appointed General Agent the office of Contracting Agent being abolished. Mr. McFall's office will be at Menominee, Mich.

#### RAILROAD CONSTRUCTION, Incorporations, Surveys, Etc.

**Ann Arbor.**—The company is now going ahead with plans for the construction of the cut-off from Ithaca, Mich., to Alma, Mich. The present main line between the two towns runs to St. Louis and thence to Alm. This is about 3½ miles longer than the proposed cut-off, which contemplates using part of the Detroit, Lansing & Northern branch from Alma to Ithaca, and which probably means the sale of the branch to the Ann Arbor road. The grading on this cut-off was completed (except in the village of Alma), in 1895. About four miles of track on the new grade and about five miles on the D., L. & N. branch will have to be built, and bridges built over the Pine River, and a mill race at Alma.

**Arkansas Northwestern.**—This company has been formed to buy and operate the old Bentonville Railroad, six miles long, between Rogers and Bentonville, in Northwestern Arkansas, with connection at Rogers with the St. Louis & San Francisco. The names of the officers of this new company are given in another column.

**Canon City, Cripple Creek & Gold Belt.**—Mr. William H. Burrage, Chief Engineer of this new road, has just left Colorado for New York, to meet a syndicate who are expected to furnish the funds for the proposed line between Canon City and Cripple Creek, Col., and its branches to Bare Hills and Freshwater. The visit of the engineer is in response to a request from the members of the syndicate.

**Chicago, Bluffton & Cincinnati.**—This company has been recently organized to take over the property of the Cincinnati, Union City & Chicago, which was recently sold by the Sheriff. The officers of the company are: F. W. Short, President; W. R. Tresher, Secretary; and W. H. Pettibone, General Manager, 184 Dearborn street, Chicago; N. W. Bliss, General Solicitor, 189 LaSalle street, Chicago. The old company did some grading, and the present condition may be summarized in the following statement: Graded from Bluffton to Camden, Ind., 18 miles; old grade from Portland to Union City, Ind., 21 miles; grading under way, Camden to Portland, 10 miles; and surveyed, Huntington to Union City, 65 miles.

**Denver, South Park & Hill Top.**—An example of fast railroad building is afforded by this company. It was organized in September, and construction was begun the same month. The road is now completed and in operation. It is only 11½ miles long, but it is an important line for the extensive mining district around Hill Top, Col. It forms a junction with the Denver, Leadville & Gunnison at Fairplay, and passing through Horseshoe District, reaches a number of old shipping mines. The line is operated by the South Park and is largely owned by officers of the latter company. The incorporators are T. F. Dunaway, General Superintendent of the Union Pacific, Denver & Gulf; S. L. Rainey, Superintendent of the South Park; Brad Du Bois and Felix Leavick. The officers are: Brad Du Bois, President; T. F. Dunaway, Treasurer, and James T. Ritchie, Secretary. It was built as a narrow-gauge line to correspond with the Denver, Leadville & Gunnison and will be operated by that company.



**Duluth, South Shore & Atlantic.**—An extension to Calumet, Mich., will, it is said, be undertaken early in the spring from Houghton, which is the present terminus of the standard gauge.

**Grand Island, Hastings & Southern.**—The certificate of organization and incorporation of this road have been filed with the Secretary of State of Nebraska. The company is composed of Morris A. Reed, Michael A. Harding, John J. Conoughy, Grant Forbes, William F. McGee and John G. Deems. The capital stock mentioned in the articles is \$5,100,000. The largest amount of indebtedness to be incurred is \$3,400,000, or two-thirds of the amount of the capital stock.

**Gulf & Brazos Valley.**—Work is steadily progressing on this road on the grading between Mineral Wells and a point on the Texas & Pacific. The company expects to have its trains running into Mineral Wells within the next 60 days and its line completed to Henrietta via Jacksborough, by next July. When finished, the road will extend from Henrietta south through Jacksborough to Mineral Wells, Tex., to Waco, and thence down the Brazos River to Velasco.

**Higginson & Des Arc.**—Articles of incorporation of this road have been filed with the Secretary of State of Arkansas. The company proposes to build a line from Higginson, White County, on the St. Louis, Iron Mountain & Southern, in a southeastern direction, to Egbert, thence to Des Arc a total distance of 23 miles. The capital stock is \$25,000. The Board of Directors is to consist of Charles Hedrick, Henry B. Walker and Fred J. Burris, Higginson; George C. Griffith, Bald Knob; Alfred J. Smith, Egbert.

**Hudson River & Berkshire.**—The projectors of this road will apply to the Massachusetts Legislature this winter for a charter to build the line, which is projected to form a new line between the Hudson River and the Connecticut Valley in Massachusetts. The following information in regard to the route is from an officer. The line will begin, he says, from Ancram, N. Y., where connection with the Poughkeepsie & Eastern is made, and is thence extended northeast, crossing the New York & Harlem at Copake Iron Works and the Massachusetts line at Egremont, thence through that town and the towns of Great Barrington, Monterey, Otis, Sandisfield, Tolland, Granville, Southwick and Westfield in Massachusetts to a connection with lines in the Connecticut Valley there. The length is about 65 miles. H. F. Keith, of Great Barrington, Mass., is Chief Engineer. This is a hilly country, and the project is a renewal of one which has been up many times before.

**Illinois Central.**—Double-tracking on this road has been completed between Villa Ridge and Cobden, Ill., 30 miles. This gives the road double-track service over about one-half of its Chicago division, from Chicago to Cairo.

**Lake Superior & Ishpeming.**—An extension of four or five miles of new road to the mines at and near Ishpeming, Mich., is to be undertaken as soon as the condition of the ground will permit. The exact amount of road to be built with other matters relating to the construction of the new line will be decided in a few weeks, Paul McKee, Chief Engineer of the company, at Marquette, Mich., is in charge of the extension.

**Lima Northern.**—The citizens of Tecumseh, Mich., have undertaken to secure a cash subsidy of \$8,000 and the right of way for an extension of this road near its present terminus at Adrian, Mich., into the town of Tecumseh.

**Mexican Roads.**—It is reported that a concession has recently been granted by the Mexican government to the state government of Tamaulipas, for the construction of a standard gauge road about 100 miles long from San Miguel, in Camargo, to San Juan, a station on the Monterey & Mexican Gulf, the Federal government paying \$500 (Mexican) cash subvention per kilometer. This road, if built, would bring Matamoros in direct connection with the main lines in Mexico, as the Mexican National Company has now a narrow gauge road running from Matamoros to San Miguel.

**New Roads.**—A company is now being organized with the object of building a road from Bridgetown, Nova Scotia, to Victoria Beach, a distance of 30 miles. A leading Halifax financier will represent outside capitalists who will finance the undertaking.

**New York & Pennsylvania.**—Contractors have recently been over the proposed line for an extension of the road northwest from Oswayo to Ceres and thence to Olean, N. Y. This will give a direct line from Olean to Hornellsville, the present terminus. The distance from Oswayo to Ceres is 18 miles, and from Ceres to Olean 10 miles.

**Pacific Coast.**—It is stated that this road, extending from San Luis Obispo to Los Olivos, Cal., 76 miles, is to be extended to Santa Ynez. J. S. Bace, Vice-President of the Oregon Improvement Company, which controls the line, is given as authority for the statement that work will be commenced at once and pushed to completion.

**Pacific Short Line.**—The Western newspapers have printed long accounts during the last week of the movements of the projectors of this line, who have recently filed new articles of incorporation in Nebraska. Mr. Donald McLean, the original projector of the line and still the active head, claims to have interested English investors in the construction of the line and says that work on the extension west of O'Neill will begin early in the spring. O'Neill is the western terminus of the Sioux City, O'Neill & Western, which was originally constructed as the Pacific Short Line for 130 miles west of Sioux City to O'Neill. The incorporators of the new Pacific Short Line who propose to build the extension are James Booge, S. F. Wakefield, L. A. Seaman, Donald McLean and M. F. Harrington.

**Pennsylvania.**—It is not the intention of the company to take any action toward elevating the tracks through New Brunswick, N. J., during the present year or until business improves. The property was bought some years ago at this place, with the intention of straightening the line and elevating it at the same time. The officers are now asking permission of the city councils to straighten the line on the ground, but nothing will be done toward elevating it at the present time.

**Pittsburgh, Shenango & Lake Erie.**—Contracts to the amount of over \$250,000 were awarded Dec. 24 for the improvement of the road, by President Samuel B. Dick. One of the most important of the contracts is that for a new dock at Conneaut Harbor, the lake terminal, awarded to Hingston & Ley, of Buffalo, at a price approximating \$125,000. The new dock will be 3,000 ft. long, and will more than double the present capacity of the harbor. Dredging for the slip has already been

started, and this will be kept up all winter. Over 12,000 oak piles will have to be driven. Over 3,000,000 ft. of lumber will be used in constructing the new dock, and the contract for this will be let next week. A contract for reducing the grades and straightening the curves on the Shenango road at Euclid Hill, 12 miles north of Butler, was let to Contractor C. L. Broadhead, of Easton, Pa., for \$125,000. This improvement will cover over seven miles of the road and will reduce the worst grade on the entire line. The contractor has shipped 40 carloads of steam shovels and other heavy machinery to this point, and work will be carried on slowly all winter. A large force of men will be put on in the spring, and the work will be rushed along to the summer. The contract stipulates that the work shall be finished by June 1.

**Roaring Creek & Charleston.**—The final work on this road between its junction with the West Virginia Central & Pittsburgh and Burlington, Bourbon County, was finished on Dec. 26, and the road is now open for traffic. It is 30 miles long, and traverses the Roaring Creek valley, cutting through a territory of virgin forests. There are six lumber mills erecting along the line already. Three coal mines are in operation on the part of the road that was built last summer, and 127,000 acres of coal land have been leased in the valley by prospective operators.

**Sheffield Coal & Iron Co.**—This company, which owns several iron furnaces at Sheffield, Ala., and mining and coking properties in Franklin and Walker counties, in Northern Alabama, has let the contract for the construction of a five-mile branch railroad, from the North Alabama railroad, at Russellville, to the brown ore beds, on Hamilton Creek. Work has now begun, and the road is to be completed by early summer, the contractors also contracting to furnish the Sheffield company 1,000 tons of ore per day from the new mines.

**Tennessee Northern.**—A charter was granted the company in Tennessee on Dec. 28. It is proposed to construct a railroad from Bibb's cut on the Knoxville & Ohio to Jellico in Campbell County, in Eastern Tennessee, with a branch to Knoxville. Altogether, about 100 miles of new railroad is proposed.

**Terminal Railway of Buffalo.**—The officers of the New York Central state that active work on the construction of this new connecting line, at Buffalo, will begin as early in the spring as possible. The line will be about 10 miles long, from Depew, on the main line of the New York Central, just east of Buffalo, to Bladell, on the Lake Shore, southwest of Buffalo. The right of way has been secured during the past year. The construction of the line will enable through trains to avoid the present delay through the city of Buffalo.

**Tuscarora Valley.**—It is stated that this road is to be extended from Port Royal to Mifflin, Pa., in the spring. For some time past surveyors have been employed in laying out a route on the west side of the river from Port Royal to Patterson. It will run back of the hill which borders the Pennsylvania. The road now extends from Blair's Mills to Port Royal, about 28 miles.

**Wyoming Development & Transportation Co.**—This company, which owns extensive mining property in the Gold Hill mining district of Wyoming, proposes to build a railroad from Fort Steel, Wyo., on the Union Pacific, near Rawlins, in the southern part of the state, running up the valley of the North Platte to its properties. Recently it has filed a mortgage for \$3,000,000 on its property in favor of the International Trust Co.

#### Electric Railroad Construction.

**Ashley, O.**—John D. DeGolley, of Mt. Gilead, and William Nicholson, of Ashley, O., are interested in the proposed electric road from Mt. Vernon to Richmond, known as the Ashley, Mt. Vernon & Richmond Electric Railway. The length of the proposed line is 50 miles, running through a thickly settled country and crossing the seven railroads which run north and south. No construction work has as yet been done.

**Baltimore, Md.**—Preliminary work is in progress in changing the "Blue Line" from a cable to an electric road. An injunction has been granted by the Circuit Court restraining Mayor Hooper and the Marshal of Police from interfering with the company in making the proposed change.

On Jan. 1 the Central Railway Co. began to operate its new line, recently completed from Caroline street to Gay street. The remainder of the new line, it is expected, will be completed within a week.

**Brantford, Ont.**—The Board of Trade is considering the question of constructing radial electric roads. It is proposed to build a road from Brantford to Ayr and another from Brantford to Dover.

**Brooklyn.**—The State Railroad Commissioners have refused the application of the Brooklyn Bridge, Prospect Park & Eastern Railroad Co. to build about 45 miles of electric roads through some of the principal streets in Brooklyn. The application was denied on the ground that no new lines were needed along the proposed routes, and if more facilities should be desired in any section it could best be supplied by extending the existing roads.

**Cleveland, O.**—The Cleveland Plain Dealer states that the Cleveland & Chagrin Falls Electric Railway Co. has succeeded in adjusting its financial matters and made arrangements for the completion of its line to Chagrin Falls immediately. The track is laid 1½ miles east of Warrensville, and the line will now be completed as soon as weather will permit. For description of this road see *Railroad Gazette* of Oct. 16, 1896, page 716.

**Hamilton, Ont.**—A scheme is on foot to amalgamate the electric railroads in and around Hamilton, in which case the Hamilton & Dundas road will be converted into an electric line and extended to Galt, while the Radial Railway will be extended to Oakville and later to Mimico.

**Greenbush, N. Y.**—The electric road between Greenbush and Brainards is being built, and when completed will be 17 miles in length. The following officers have been elected: President, W. H. Nichols; Vice-President, T. E. Jones; Secretary, Dr. Curran; Treasurer, Fred Carr; General Manager, J. F. Lape.

**Milford, Conn.**—Those interested in the proposed electric roads in the vicinity of Milford will petition the legislature for permission to connect with the lines of the Bridgeport Traction Co., which would form a parallel of the steam road between Milford and Bridgeport.

**New York.**—The Third Avenue Railroad Co. has just concluded a contract with the General Electric Co. for the electrical apparatus for its new extension from 165th street and Amsterdam avenue, via the Kingsbridge road

to Spuyten Duyvil Creek, a distance of about 2½ miles. The power house will contain a battery of 15 Babcock & Wilcox boilers, having a total capacity of 2,500 H. P. The engines will be of the Allis-Corliss type, from the shops of the E. P. Allis Co., and will be three in number, of 1,100, 700 and 500 H. P. capacity, respectively. Each engine will be directly connected to a G. E. multipolar railway generator of 800 kw. 500 kw. and 300 kw. capacity respectively. The switchboard will be of the standard G. E. panel type, and will be equipped with the most recently developed switchboard apparatus. The overhead wires will be suspended from brackets fastened to ornamental central poles, and each alternate pole will carry a 1,200 C. P. arc lamp, current for which will be generated by two direct-connected 125 arc-light Brush dynamos. The feeders will be laid underground. The cars will be of the very best construction and will be set on double trucks. Each car will be supplied with two motors of the capacity of the G. E. 1,000, one motor being set on each inside axle.

**Niagara Falls, N. Y.**—The Niagara Falls & Suspension Bridge Street Railway Co. expects to start early in the spring to extend its newly acquired Duvil's Hole line from its present terminus to the Riverdale Cemetery.

**Penn Yan, N. Y.**—Representatives interested in an electric road to run from Penn Yan to Branchport appeared before a special meeting of the Board of Trustees and outlined the plan, which is briefly as follows: It is intended to organize a stock company with a capital of \$100,000. Of this sum \$70,000 is already pledged by a syndicate. The road is to run from Branchport to both railroad stations in Penn Yan, by way of Keuka college, and the assembly grounds. The power house is to be located about midway between the two places.

**Pittsburgh.**—The new line of the Consolidated Traction Co., from Bryant street, East end, to the city, was open for service on Dec. 28.

The Consolidated Traction Co. is preparing to connect the Millvale double track lines to the main line. When this is done transfers will be given instead of running the cars around the loop in Millvale, as at present. Day cars will then run through to Etna.

**Providence, R. I.**—It is stated that the Union Railroad Co. has decided to extend its Pawtuxet Valley line to Natick, the work to commence next spring. This will connect Washington, Anthony, Quindick, Jericho, Fiskville and other villages along the route.

**Quincy, Mass.**—The order granting the Quincy & Boston Street Railway Co. a location for a double track on Hancock street was passed by the City Council on Jan. 1.

**St. Louis.**—F. E. Allen, B. Jones, E. H. Benoist and F. Vierling, representing a new corporation, have filed a petition for a franchise to build an electric road, the location of which has not been made public.

**Southington, Conn.**—It is stated that a company is being organized in Southington to secure a charter for an electric road to run from Plainville to that place.

**Syracuse, N. Y.**—The Syracuse Rapid Transit Co. will soon place 30 new cars on the various lines in the city. The cars will have electric signal buttons at the back of each seat and will be provided with a new style of cash and transfer register. The cars will be warmed by electric heaters.

**Toledo, O.**—The project of the construction of an electric railroad between Toledo and Petersburg, Mich., about 20 miles, is being revived. Oliver S. Bond is interested.

Mr. C. J. Geddes is actively promoting the proposed Toledo, Bowling Green & Fremont line. Considerable right of way has been secured and some surveys have been made. The plan is to absorb the Tiffin & Fostoria line and pass through West Millgrove and possibly through Prairie Depot, Jerry City, Cygnet, Munger, Portage and other points to Bowling Green. Mr. C. A. Denman has been appointed General Manager of the new road.

**Trenton, N. J.**—The Union Contracting and Construction Co. has been incorporated by J. J. Cahill, E. E. Marshall and L. Barden to build electric roads and lighting plants in the United States and Canada. Capital stock, \$100,000.

**Washington, D. C.**—Receiver Schoepf, of the District of Columbia Division of the Columbia & Maryland Railway, states that the Washington end of the Belt Line will be finished about Feb. 1. Power will be secured from the Eckington line to operate the division. He states that the plan to use compressed air motors on the Eckington line has not been abandoned, although final arrangements are still incomplete. Congress has been asked to grant an extension of time in which to give the new motors a trial, as mentioned among our notes last week.

**Waterbury, Conn.**—The Waterbury Traction Co. will petition the legislature for time in which to extend its tracks, one of its plans being an extension northward to Waterville and perhaps Thomaston paralleling the Naugatuck Division of the N. Y., N. H. & H. R. R.

**York, Pa.**—W. H. Lanius, President of the York Street Railway Co., is interested, with a number of other gentlemen, in the construction of an electric road to run from the city of York through Dallastown, Innersville, Manchester, Emigsville, Wrightsville, Stony Brook, Dover and Weiglesstown. Most of these towns are without railroad communication, and the projected road will carry freight as well as passengers. A charter has been issued for the Black Mountain Electric Railroad, but no work has yet been done on the road. Mr. Lanius writes us that work on all the roads will be begun as soon as favorable action is taken on electric roads by the legislature.

#### GENERAL RAILROAD NEWS

**Bentonville.**—Articles of purchase of this road by the Arkansas Northwestern Railroad Co. were filed on Dec. 19 at Little Rock, Ark., in the office of the Secretary of State. The sale was authorized at a meeting of the stockholders held Feb. 18, 1895. The purchase price is given at \$22,500. The capital stock of the new company is \$320,000.

**Cape Fear & Yadkin Valley.**—The attorneys for the Receiver of the North State Improvement Co., which built the railroad, have been notified by Judge Simonson, of the United States Circuit Court, to appear before him, Jan. 14, at Wilmington, N. C., when the long-delayed decree of sale of the property will be issued. The road is over 390 miles long, and is bonded in sections known as "A," "B," and "C" bonds. Interested per-



sions have been endeavoring to have the road sold in the sections represented by these bonds instead of as a whole.

**Central Ohio.**—The directors held a meeting at Baltimore, Jan. 4, to formulate a plan to secure the payment from Baltimore & Ohio of over \$750,000, due for rentals and receipts from a section of road which is under lease to the Baltimore & Ohio. After adopting resolutions looking to an immediate settlement with the Baltimore & Ohio, the Central Ohio directors appointed a committee, which subsequently conferred with Receivers Cowen and Murray. Mr. Cowen stated after the conference that the Central Ohio directors were satisfied with the explanation of affairs made by the Receivers. The Receivers asked that under the orders of the Court they take the gross receipts of the Central Ohio, pay the operating expenses, and the interest on the mortgage bonds, and when any balance may be left they will pay that to the company.

**Chicago, Milwaukee & St. Paul.**—Earnings for November are reported as follows:

	1896.	1895.	1894.
Gross earn.....	\$2,738,520	\$3,416,687	\$2,519,014
Oper. expen.....	1,452,891	1,762,860	1,532,858
Net earn.....	\$1,285,629	\$1,653,827	\$986,156
Prop. exp. to gross.....	54%	5 3/4	6 3/4
Gross 4 mos.....	11,167,404	15,303,069	12,591,567
Net 5 mos.....	5,513,868	6,665,735	4,432,814
Net in November, 1893, \$1,278,505; in 1892, \$1,405,047.			

**Cincinnati, Jackson & Mackinaw.**—The Railroad was sold at Van Wert, Ohio, on Jan. 5, to United States Senator Calvin S. Hrice, President of the company. The consideration was \$1,000,000.

**Cleveland, Lorain & Wheeling.**—The earnings in the year ending June 30 were:

	1896.	1895.	Inc. or dec.
Gross earn.....	\$1,586,917	\$1,360,464	I. \$226,453
Exp. and taxes.....	1,146,743	959,036	I. 187,707
Net earn.....	\$440,172	\$401,428	I. \$38,744
Other income.....	2,580	1,500	I. 1,080
Total income.....	\$442,752	\$402,928	I. \$39,824
Fixed charges.....	297,274	272,157	I. 25,117
Balance.....	\$145,478	\$130,771	I. \$14,707
Dividends.....	100,000	.....	I. 100,000
Surplus.....	\$45,478	\$130,771	D. \$85,293

**Fredrick & Northern.**—This company was organized in Baltimore this week with Samuel Rea, Assistant to the President of the Pennsylvania, as the President, and Albert Hewson, Secretary and Treasurer. This company is the successor to the Frederick & Pennsylvania Line sold under foreclosure proceedings last year. The road extends from a connection with the Hanover & York Railroad at the Pennsylvania-Maryland State line, near Kingsdale, to the City of Frederick, 28 miles. Action has been taken looking to the consolidation of the Frederick & Northern and the Hanover and York into one company, to be known as "York, Hanover & Frederick Railroad Company." The Frederick & Northern Company is organized with stock of \$150,000 and no bonds.

**Hendersonville & Brevard.**—Judge Dick, of the U. S. Circuit Court, issued an order on Dec. 23, at Greensboro, N. C., appointing T. C. McNeely Receiver of the property. The road is 22 miles long and extends from Hendersonville, on the Southern Railway, to Brevard, through Transylvania and Henderson counties, in the western part of North Carolina. It was built last year by the firm of which Mr. McNeely is a member, and the members of that firm own the road and are its officers.

**Kentucky Midland.**—The road was sold at Frankfort, Ky., Jan. 4, to Atilla Cox, of Louisville, at the upset price \$150,000. The road is 40 miles long, and connects Frankfort with Georgetown and Paris, Ky. Mr. Cox is President of the Louisville, Henderson & Texas road.

**Manhattan.**—Justice Truax, in the New York Supreme Court, has denied a motion made by a bondholder to restrain the directors from paying out the quarterly dividend of 1 1/2 per cent., due and payable Jan. 1. The plaintiff based his application on the ground that a dividend had not been earned. The company's attorney contended that a bondholder could not appear in an action of that kind, and the Justice so decided.

Attorney-General Hancock, of New York state, has declined to take action on the application made before him to bring suit in the name of the state against the directors to prohibit the further declaration of dividends and to compel the refunding of certain sums already paid out as dividends. Those who brought the action now propose to appeal to the railroad commissioners to have the Board take action.

**Michigan Central.**—An agreement has been entered into between the Michigan Central, the Chicago Terminal and the Chicago, Hammond & Western roads by which the possession of the Terminal has been turned over to the Michigan Central. The Michigan Central and the Hammond Belt line have the right to use each other's tracks as now built, or any which may be hereafter built, into Chicago and in Lake County, Ind., including all connecting and industrial tracks of the Michigan Central between Calumet Park and Hammond, each road is to pay the other 4 per cent. per annum on the value of the tracks used, but the minimum paid is never to be less than 40 per cent. of the total earnings of the traffic over the tracks so used. The Michigan Central pays \$300,000 for the Terminal road from the stock yards to Elsdon.

**Middle Georgia & Atlantic.**—President Comer has bought for account of the Central of Georgia, a controlling interest in this road, about 70 miles long, extending from Covington to Milledgeville, Ga. The terms are not published. The purchase is said to have been made in order to protect, if possible, the Georgia Central's interest in the Georgia Railroad lease, the Louisville & Nashville, which controls half the lease, having reached no agreement as to the status of the Central's interest under the foreclosure of the old company, which was the original joint lessee.

**Reading Co.**—Attorney-General McCormick, of Pennsylvania, has decided in favor of the company in the suit affecting the validity of the charter under which the company has been organized. He states his belief that the Commonwealth cannot now successfully attack the chartered rights of the company, which had been exercised prior to Jan. 1, 1874, when the new constitution became operative. It had power to do the business in which it was engaged prior to that time; and the question of whether the other grants of special privileges set forth in the charter continued after Jan. 1, 1874, is held open for determination when the occasion shall arise. The opinion says:

"My view of the whole matter is that the charter of

the company authorized it to do the kind of business in which it engaged prior to Jan. 1, 1874, which business was of the same general character as that in which it proposes to engage for the purpose of controlling the stocks of the railway company and the coal and iron company."

**Pennsylvania.**—The November earnings are reported as follows:

	1896.	1895.	1894.
Gross earn.....	\$5,246,424	\$5,877,624	\$5,463,857
Oper. expen.....	3,450,166	3,868,566	3,557,570
Net earn.....	\$1,786,258	\$2,009,058	\$1,906,287
P. c. expen. to earn.....	65%	65%	65
Net 11 months.....	16,565,471	17,983,171	16,791,622

Directly operated lines west of Pittsburgh and Erie report November gross decreased \$1,026,800 and net decreased \$662,207; net eleven months decreased \$1,896,900. All lines east of Pittsburgh and Erie report gross decreased \$841,100 and net decreased \$287,400; net eleven months decreased \$2,214,800. All lines west of Pittsburgh and Erie report gross decreased \$1,933,800 and net decreased \$593,900; net eleven months decreased \$1,868,500.

**Philadelphia & Reading.**—The company has assumed the direct operation of the Philadelphia, Newtown & New York and Stony Creek roads, short lines at Philadelphia. The change is merely one of convenience and economy, as the roads can be managed more economically together than they can be conducted separately. The Reading acquired control of the Stony Creek by its lease some years ago of the North Penn, which held a majority of the stock.

**Pittsburgh & Western.**—Thomas M. King, President and Receiver of the company, has been authorized to arrange with the Finance Company of Philadelphia for a loan of \$400,000 to pay for rentals of equipment and rolling stock.

**Pittsburgh, Shenango & Lake Erie.**—The directors of the road at a meeting held in Meadville, Pa., Dec. 22, formally authorized the merger and consolidation of their line with the Butler & Pittsburgh, which will take effect upon its notification by the stockholders of the respective companies.

**St. Lawrence & Adirondack.**—The New York State Board of Railroad Commissioners has approved the application of the Company for permission to increase its capital stock from \$1,000,000 to \$1,300,000.

**Southern Pacific.**—The report for November shows:

	1896.	1895.	Dec.
Gross earn.....	\$4,503,832	\$4,756,190	\$252,358
Oper. expen.....	2,741,376	2,864,773	123,402
Net earn.....	\$1,762,456	\$1,891,412	\$128,956
Net 11 mos.....	15,115,890	15,424,591	308,011

**Summit Branch.**—A bill in equity has been filed in the Common Pleas Court at Philadelphia, asking for an injunction restraining the trustee of the mortgage for \$1,475,000, from foreclosing it; restraining the Pennsylvania Railroad Company from issuing execution on certain judgments against the Summit Branch Company; restraining the directors from further acting as officers, and that a Receiver be appointed for the company.

**Terre Haute & Logansport.**—Ex-President Harrison, as trustee of the mortgage bondholders of this Division of the Vandalia Road, has brought suit to foreclose the mortgages for \$1,500,000.

#### Electric Railroad News.

**Brooklyn.**—The gross earnings of the Brooklyn Rapid Transit Co. for December and the six months are shown below:

	1896.	1895.	1894.
December.....	\$371,729	\$376,236	\$376,638
Brooklyn Heights.....	57,332	53,595	54,304
B. Queens Co. & Suburban.....	.....	.....	.....
Total for system.....	\$429,671	\$430,831	\$430,942
Six Mos. to Dec. 31.....	\$2,349,921	\$2,295,646	\$2,414,981
Brooklyn Heights.....	384,278	351,129	331,346
B. Queens Co. & Suburban.....	.....	.....	.....
Total for system.....	\$2,734,199	\$2,589,775	\$2,746,327

The earnings of each of the two companies operated by the Rapid Transit Co. for the calendar year are given as follows:

**Brooklyn Heights.**

	1896.	1895.	Inc. or Dec.
Gross earn.....	\$4,548,761	\$3,987,295	I. \$561,465
Oper. expen.....	2,636,153	2,821,940	D. 185,787
Net earn.....	\$1,912,607	\$1,165,355	I. \$746,252
Other income.....	184,421	184,163	D. 257
Gross income.....	\$2,097,028	\$1,349,518	I. \$747,510
Fixed charges & taxes.....	2,007,423	2,056,716	D. 49,293
Balance.....	sur. \$89,605	def. \$706,758	\$796,364
(Dec. 1893 partly estimated.)			

**Brooklyn, Queens County & Suburban.**

	1896.	1895.	Inc. or Dec.
Gross earn.....	\$720,300	\$615,204	I. \$105,096
Net earn.....	259,609	181,390	I. 88,219
Gross income.....	274,500	204,357	I. 69,642
Fixed charges & taxes.....	554,714	359,013	I. 195,701
Deficit.....	\$79,214	\$134,156	D. \$54,912

An ordinance has been adopted by the Common Council to amend the present ordinance relating to the stoppage of cars at crossings. It provides that the passengers shall be received and discharged only at the rear platform at the far crossing. A stop must be made in the middle of blocks which are over 300 ft. in length. The Mayor has signified his intention to sign the ordinance.

**Cincinnati, O.**—It is announced that within a very short time the general office of the Cincinnati, Newport & Covington Street Railway Co. will be removed from Cleveland to Cincinnati.

**Dallas, Tex.**—A resolution to issue \$150,000 of first preferred six per cent. gold bonds was adopted on Dec. 29 by the reorganization committee of the Dallas Consolidated Street Railway Co., the money to be used in changing the motive power of the lines to electricity. Baltimore investors own a controlling interest in the property.

**Detroit, Mich.**—The Detroit Railway filed deeds on Dec. 26 formally conveying to the Detroit Electric Railway the title to its electric machinery, its cars and all the property not heretofore turned over to the new company.

It has been announced that Tom L. Johnson, President of the Detroit Citizens' Street Railway Co., and Albert Pack, President of the Detroit Railway, which is operated by the former company, have purchased most of the stocks and bonds of the Fort Wayne & Belle Isle Railway Co. The amount is said to exceed \$1,000,000.

**Portsmouth, N. H.**—It is stated that a party of Massachusetts capitalists has purchased the franchise of the Kittery, Kittery Point & York Beach Electric Railroad Co., and the work of construction will be commenced at once. It is expected that work will be finished by June 1, 1897.

**Raleigh, N. C.**—The power-house and nearly all the cars of the Raleigh Electric Co. were destroyed by fire last week, the loss being over \$50,000. At a meeting of the stockholders this week it was determined to rebuild the plant at once, which will include the purchase of several dynamos and other machinery to supply power for the railroad and for lighting purposes.

**St. Thomas, Ont.**—The owners of the Berlin Electric Railway are said to be negotiating for the purchase of the street road in St. Thomas and change the motive power to electricity.

**Salisbury, N. C.**—The Board of Aldermen has ordered a bill drafted for passage by the legislature, which meets next month, providing for an election on the question of issuing \$100,000 of 5 per cent. bonds to build an electric road and electric light plant to be owned and operated by the city.

**Savannah, Ga.**—The property of the Savannah Electric Railway Co. was sold on Tuesday of this week for \$210,000 to Herman Myers, of Savannah, and J. H. Fall, of Nashville, representing a syndicate of New York bondholders. The bonded indebtedness of the company is \$600,000. It is expected that the company will be reorganized at once, and a large amount of money spent for new apparatus.

**West Chester, Pa.**—A mortgage for \$600,000, given by the Chester County Central Railway Co. to the Fidelity Insurance, Trust & Safe Deposit Co., of Philadelphia, was recorded on Dec. 29. It is given to secure the payment of 500 30 year bonds of \$1,000 each and 200 bonds of \$500 each. This money has been raised for the purpose of constructing an electric road from Philadelphia to West Chester. A large part of the stock has already been taken.

The West Chester Electric Railway Co. has secured a tract of 100 acres near Newtown Square and will make it a summer resort. The electric road will be extended from Newtown Square to Castle Rock, which is a mile east of the village and on the newly-purchased property.

#### TRAFFIC.

##### Chicago Traffic Matters.

CHICAGO, Jan. 6, 1897.  
The Western Passenger Association still haggles over the question of the adoption of a new form of mileage ticket. Several of the general passenger agents are strongly in favor of Sebastian's mileage ticket, which calls for the payment of full fare by users, and when credit slips have accumulated for three or five thousand miles of travel a rebate is made for the amount paid over two cents a mile. But the idea is not favorably received by the drummers, and there is some opposition to it among the general passenger agents.

The trial of ex-President Reinhardt, of the Santa Fe, and ex-Traffic Manager Hanley, for alleged violation of the Interstate law in paying rebates in 1892 begins this week in the United States District Court. All the officials of the Santa Fe, including President Ripley and Aldace F. Walker, who was Receiver of the road at that time, have been subpoenaed to appear at the trial.

The statement, by roads, of receipts and shipments of live stock for the year just ended, shows that 277,437 cars were received, and 73,875 cars shipped out. In the receipts the Burlington road shows the largest total, both in cattle and in hogs. The St. Paul leads in sheep and in horses. The total of 277,437 cars is only slightly larger than the total for 1895, and is 9,515 smaller than 1894. About 8 per cent. of the total, as will be seen by the table, came from east of Chicago. On the Burlington the increase over 1895 is about 12 per cent., and the total receipts by that road are the largest it ever showed. The following is a statement of the number of cars received and shipped by the various lines:

	Receipts, cars.	Shipments, cars.
	1896.	1895.
A. T. & S. F.....	11,378	13,303
B. & O.....	160	229
C. & A.....	16,482	15,141
C. B. & Q.....	70,917	63,072
C. & Erie.....	385	472
C. & E. I.....	4,404	5,605
C. & G. T.....	143	34
C. M. & St. P.....	42,398	42,445
C. & N. W.....	53,173	50,114
C. R. I. & P.....	27,174	26,200
C. G. W.....	9,914	7,975
Ill. Central.....	21,176	22,567
L. S. & M. S.....	449	720
L. N. A. & C.....	2,327	2,694
Mich. Central.....	616	1,289
N. Y. C. & St. L.....	409	452
P. C. & St. L.....	1,541	1,338
P. Ft. W. & C.....	349	512
Wabash.....	11,249	14,081
Wis. Central.....	2,730	1,988
Totals.....	277,437	270,815

The weekly statement of freight shipments eastbound shows that the tonnage to and beyond Buffalo, Pittsburgh, etc., amounted to 76,782 tons, of which 8,194 tons were flour, 35,265 tons grain and 8,767 tons provisions. Compared with the same week last year the falling off is very decided. The quantities and percentages as carried by the different lines were as follows:

	WEEK TO DEC. 31.	WEEK TO DEC. 24.
	Tons.	p. c.
Baltimore & Ohio.....	6,197	8.1
C. C. & St. Louis.....	12,168	15.8
Chicago & Erie.....	5,825	7.6
Grand Trunk.....	10,532	13.7
L. S. & M. S.....	9,636	12.6
Michigan Central.....	8,903	11.3
N. Y. C. & St. L.....	7,096	9.2
Pitts., Chi. & St. Louis.....	5,588	7.3
Pitts., Ft. Wayne & Chicago.....	6,977	9.1
Wabash.....	3,833	5.0
Totals.....	76,782	100.0